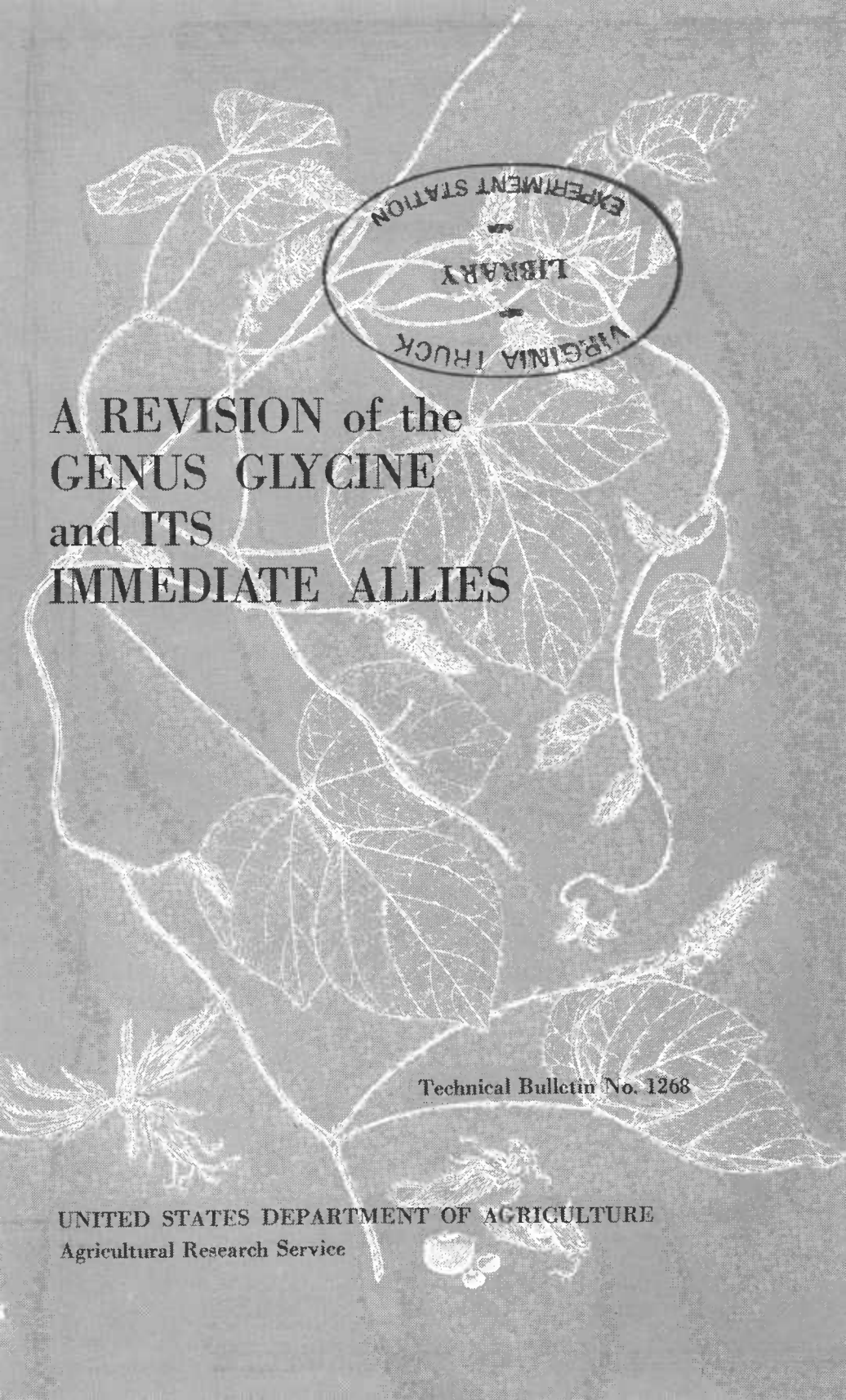



# A REVISION of the GENUS GLYCINE and ITS IMMEDIATE ALLIES

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# CONTENTS




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# A REVISION OF THE GENUS GLYCINE AND ITS IMMEDIATE ALLIES

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## INTRODUCTION

The claim of the Old World leguminous genus *Glycine* to economic importance rests very largely upon its inclusion of the soybean, *Glycine max* (L.) Merr. A few others among the more common and widely ranging species, such as the principally African *G. javanica* L. and the Australian *G. Canescens* F.J.Herm. (*G. sericea* Benth., not Willd.), are of value as fodder, but their use does not compare in importance with that of *G. max*, which is used so extensively for human food and oil.

Agronomists attempting to improve strains in the world's soybean crop have been interested in the wild species of *Glycine* as potential material for interspecific crosses, but the literature on the subject has been not only extremely vague for the most part but frequently decidedly misleading. A tabulation of the species described as *Glycine* from Index Kewensis, for example, results in a total of 286 and the addition of published subspecies and varieties brings the number to 323. So loosely has the genus been defined, even in recent years, that the estimate of valid species within the group by current authors has varied from "some 60" by Hauman [2] to "perhaps 40 or more" by Bailey,[3] and to 16 by Willis.[4] It was in the hope of clarifying the almost chaotic condition of taxonomic information relating to the

[1] Dr. Hermann is now Curator of the U.S. Forest Service Herbarium. Grateful acknowledgment is made to Regina O. Hughes, of this Division, for the drawings accompanying the text; to Paul G. Russell, collaborator with the New Crops Research Branch, for help with seed terminology; and to the custodians of the various herbaria who generously loaned specimens in their collections for the purpose of this study. Chief among these herbaria were: Arnold Arboretum and Gray Herbarium, Cambridge, Mass.; British Museum (Natural History), London; Jardin Botanique de l'État, Brussels; Botanical Museum and Herbarium, Copenhagen; Istituto Botanico, Florence; Conservatoire Botanique, Geneva; Royal Botanic Gardens, Kew; Rijksherbarium, Leiden; Missouri Botanical Garden, St. Louis, Mo.; Muséum National d'Histoire Naturelle, Paris; National Taiwan University, Taipei, China; Naturhistorisches Museum, Vienna; and U.S. National Herbarium, Washington, D.C.

[2] HAUMAN, LUCIEN. SPERMATOPHYTES. *In* Flora du Congo Belge 6: 92–101. Bruxelles. 1954.

[3] BAILEY, L. H. MANUAL OF CULTIVATED PLANTS. 1,116 pp. Macmillan Co. 1949.

[4] WILLIS, J. C. DICTIONARY OF THE FLOWERING PLANTS AND FERNS. Ed. 6, 752 pp. Cambridge. 1948.

genus that the present study was undertaken, and the resulting realinement indicates that the actual number of species throughout its complete range in Africa and Asia (almost entirely tropical with the exception of *G. ussuriensis* Regel & Maack.) is evidently 10, in addition to which 9 infraspecific taxa of varying degrees of distinctness and stability are recognized.

The problem of speciation in *Glycine* was not found to be a major one in the present review of the group; the difficulties were largely generic. The major tasks were two: Adequately to delimit the genus among an extensive series of allies bearing close resemblance to *Glycine* and often strong affinity with it, and to identify the host of names that had been mistakenly associated with *Glycine*. It is hoped that the definition of the genus as here restricted and the accompanying key to related genera will contribute toward the first of these two objectives and that the list of species now excluded from the genus with their attempted reidentification will be found useful.

It was found that genera already described would accommodate the majority of the species that had to be excluded from *Glycine*, but for 11 of the excluded species 2 new genera had to be set up and are characterized in this paper. Because so large a proportion of the species ascribed to *Glycine* were proposed by early authors at a period when descriptions were habitually of such brevity that the characters delineated would apply to several or many different plants under our modern concepts, and because the practice of designating type specimens, to establish beyond question the identity of the plant described, was not yet in vogue, it was necessary to search the principal European herbaria in an attempt to find the specimen upon which each description was based. In the majority of cases this search was successful and the name was satisfactorily disposed of. In a few instances the types are evidently lost and where the description is too fragmentary to offer a decisive clue to the identity of the plant involved, the name must still remain in doubt, although in no case does it seem likely from the evidence available that it can be applicable to a true *Glycine*.

The chief reason for the heterogeneous composition of the genus *Glycine* as earlier defined is well brought out in the following observation by Bentham,[5] made nearly a century ago:

> Up to the time of De Candolle's "Prodromus" [1825] the genera *Glycine* and *Dolichos* had become the receptacle for all the Phaseoleae which had no very striking character to distinguish them. He still retained, however, two distinct types, afterwards well separated by Arnott (in Wight and Arnott, "Prodromus Florae Peninsulae Indiae Orientalis")—one with alternate stamens abortive and remarkably hooked pod, the other with the stamens all perfect and the pod straight or slightly incurved at the end—one represented by *G. labialis*

[5] BENTHAM, GEORGE. Linn. Soc. London, Jour. Bot. 8: 63–64. 1865.

L.f., the other by *G. javanica* L. Not being aware that either group had been previously published as a genus, Arnott retained the name *Glycine* for the former as containing the commonest and most widely spread species, and gave to the latter the new name *Notonia*, which he afterwards changed to *Johnia* on perceiving that De Candolle had already published *Notonia* in Compositae. This nomenclature was unfortunate; for present investigations have shown that *Glycine* so limited not only excluded all the species of the elder Linnaeus, but was identical with *Teramnus* Swartz, adopted in the 'Prodromus', and that *Johnia*, on the other hand, comprising *G. javanica* L., which had never yet been generically separated, had much more legitimate ground for retaining the Linnean name.

Recent authors have been less prone to assign nondescript new species of the Phaseoleae to *Glycine*, particularly since the appearance of Bentham and Hooker's Genera Plantarum.[6] If any one factor more than another has led contemporary taxonomists to confuse with *Glycine* plants properly belonging to related genera, it is the failure to take into account fundamental differences in seed morphology. The majority of generic keys have been quite misleading in characterizing the seed of such genera as *Glycine* and *Galactia* as estrophiolate, whereas they can be so considered only if a distinction is made between the terms "strophiole" and "caruncle", which is very rarely done. Such a distinction is basic and in order not to cause confusion with reference to traditional keys to the tribe, the term "strophiole" in this publication is restricted to mean an arilloid, cushionlike, cartilaginous outgrowth around the hilum, well illustrated in the seeds of such genera as *Kennedya*, *Cantharospermum*, and *Paraglycine*, whereas the term "caruncle" is applied to the squamiform, papyraceous appendage to the hilum characterizing true *Glycine*, *Teyleria*, and *Galactia*.

The importance of seed characterics as taxonomic criteria, not only in *Glycine* but in most of its allies, became so evident in the course of the present study that it seems likely that its significance has been generally underestimated in at least the rest of the Lotoideae (Papilionatae).

## TAXONOMIC HISTORY OF THE GENUS GLYCINE

Linnaeus[7] proposed eight species under the name *Glycine* in 1753 in Species Plantarum (pp. 753–754). The cultivated soybean, *Glycine max*, appeared in the same work as *Phaseolus max* (p. 725) and also under the name *Dolichos soja* (p. 727). Of the eight Linnaean species under *Glycine*, the first, *G. apios*, is what we now know as *Apios*

[6] BENTHAM, GEORGE, and HOOKER, J. D. GENERA PLANTARUM. 1,040 pp. London. 1862–67.

[7] LINNAEUS, CARL. SPECIES PLANTARUM. vol. II, 1,200 pp. Stockholm. 1753. (Paged continuously.)

*americana* Medic.; his *G. frutescens* is *Wisteria frutescens* (L.) Poir.; *G. abrus* was later removed from *Glycine* by Linnaeus himself as *Abrus precatorius* L.; *G. tomentosa* is *Rhynchosia tomentosa* (L.) H. & A.; *G. comosa* and *G. bracteata* are *Amphicarpa bracteata* (L.) Fern.; *G. javanica* L. remains in *Glycine* as the type of the genus; and *G. bituminosa* is *Fagelia bituminosa* (L.) DC.

None of several species ascribed to the genus by Thunberg [8] in 1800 were actually congeneric with *G. javanica* L., nor were those proposed by Willdenow [9] 2 years later in the third edition of the Species Plantarum.

In 1825 De Candolle [10] summed up the genus as embracing 21 species, of which only 2 (*Glycine clandestina* Wendl. and *G. javanica* L.) can be admitted to the genus as here defined. De Candolle's generic concept still included such discordant elements as *G. striata* Jacq. (a *Galactia* from the Western Hemisphere); *G. secunda* Thunb. (a *Rhynchosia*); and the Asiatic *Teramnus labialis* (L.f.) Spreng., under 2 names (*G. debilis* Ait. and *G. senegalensis* DC.), although he had accepted Swartz's segregation of the American *Teramnus uncinatus* and *T. volubilis* from *Glycine*.

It was not until 1864 that the first major addition to the genus was made. This was by Bentham,[11] who treated the genus in Australia as comprising six species, all of them still valid although two of his names (*Glycine sericea* and *G. tomentosa*) must be dropped as being later homonyms. Three of his six species were transfers to *Glycine* of species earlier described by other authors under different genera (*Leptocyamus sericeus* F. Müll., *Kennedya tabacina* Labill., and *Zichya latrobeana* Meissn.); one was Wendland's *G. clandestina* described in 1798 (p. 54); [12] and the remaining two were Bentham's own, although he had described one of them (*G. tomentosa*) a quarter of a century earlier under the untenable generic names *Leptolobium* and *Leptocyamus* and it (along with *G. clandestina* and *G. tabacina*) had been subsequently shifted by Steudel (p. 845),[13] to his superfluous genus *Kennedynella*.

By the time of Bentham and Hooker's *Genera Plantarum* (1867),[14] the genus was recognized as being confined to the Eastern Hemi-

[8] THUNBERG, C. P. PRODROMUS PLANTARUM CAPENSIUM. 191 pp. Uppsala. 1800.

[9] WILLDENOW, K. L. *In* SPECIES PLANTARUM. 3(2) : 1053–1068. Ed. 3. Berlin. 1802.

[10] CANDOLLE, AUGUSTIN, DE and CANDOLLE, ALPHONSE, DE. PRODROMUS SYSTEMATUS NATURALIS 2 : 241–243. Paris. 1825.

[11] BENTHAM, GEORGE. FLORA AUSTRALIENSIS. 2 : 242–245. London. 1864.

[12] WENDLAND, J. C. GLYCINE CLANDESTINA. Bot. Beobacht. 58 pp. 1798.

[13] STEUDEL, E. G. NOMENCLATOR BOTANICUS. Ed. 2, v. 1, 852 pp. Stuttgart. 1840.

[14] See footnote 6, p. 3.

sphere and the number of species estimated to be about 12. Species attributed to *Glycine* continued to be proposed for the most part sporadically after this publication as they had earlier, but Bentham's *Glycine falcata* of 1864 was the last of the true *Glycine* species to be described. Since that date all species proposed have proved to be either not congeneric, or synonymous with already named species, or not of specific rank, although a few new names have had to be subsequently adopted because of the rule invalidating later homonyms which went into effect since Bentham's time.

No monographic study of the genus as a whole was undertaken, but three regional treatments are of significance (Taubert's[15] brief summary (pp. 360–362) in Engler and Prantl in 1894 added nothing not already known). In the first of these, that of J. G. Baker,[16] descriptions are given for seven species from that region of which only *Glycine javanica* and *G. petitiana* can be retained in the genus as now circumscribed.

In 1929 E. G. Baker[17] recognized 17 species, of which again all but *Glycine javanica* and *G. petitiana* are now either transferred to other genera or reduced to infraspecific rank.

The most recent, and most detailed, regional treatment is that by Hauman[18] in 1954, where the rich Congo representation of the genus is considered as referable to *Glycine javanica*, with one subspecies and five varieties, and of four additional species which, chiefly because of their strophiolate seeds and pubescent petals among other differences, are here argued to be generically distinct.

## TAXONOMY

### Key to Genera Related to Glycine

1a. Leaflets punctate; flowers yellow (the standard often brown- or purple-streaked in *Rhynchosia*); bracteoles none; membranaceous bracts usually fugacious.

2a. Pod many-seeded; seed conspicuously strophiolate.

3a. Legume turgid; glutinous, heavy-scented herb. (South Africa)---*Fagelia*

3b. Legume compressed, strongly depressed between the seeds. (Tropical Asia and Australia)--*Cantharospermum* (*Atylosia*)

2b. Pod 2-seeded; seed estrophiolate or the strophiole ± obsolete; legume compressed---*Rhynchosia*

---

[15] TAUBERT, P. LEGUMINOSAE. *In* Engler, A., and Prantl, K. Die Natürlichen Pflanzenfamilien, t. III. Abt. 3, pp. 70–384, illus. Leipzig. 1894.

[16] BAKER, J. G. *In* Oliver's [Daniel] FLORA OF TROPICAL AFRICA. 2: 178–180. London. 1871.

[17] BAKER, E. G. THE LEGUMINOSAE OF TROPICAL AFRICA. Pt. II, 953 pp. 1929.

[18] See footnote 2, p. 1.

1b. Leaflets not punctate; flowers not yellow (except in *Dumasia*, with obliquely truncate calyx; yellowish white in *Pseudoglycine*).
4a. Pod thick-coriaceous, torulose, not septate; leaflets 7 or more; flowers large and showy ---------- *Wisteria*
4b. Pod not thick-coriaceous, more or less compressed, often septate between the seeds.
5a. Keel horseshoe-shaped or produced into an incurved or involute beak; flowers showy ---------- *Apios*
5b. Keel not horseshoe-shaped nor produced into an involute beak.
6a. Style bearded ---------- *Dolichos*
6b. Style not bearded.
7a. Calyx 4-parted, the acute teeth subequal; inflorescence conspicuously nodose, vexillar stamen free ------ *Galactia*
7b. Calyx (except in the Asiatic genus *Shuteria*) 5-parted; inflorescence not nodose or obscurely so (except in *Teyleria*).
8a. Flowers more than 10 mm. long; standard erect.
9a. Seeds with a conspicuous cartilaginous, arilloid strophiole; keel equaling or longer than the wings; pod septate ---------- *Kennedya*
9b. Seeds estrophiolate; keel shorter than the wings; pod not septate.
10a. Calyx apparently 4-toothed (the upper pair of the 5 fused); flowers not yellow ------ *Amphicarpa*
10b. Calyx obliquely truncate at the mouth; flowers yellow ---------- *Dumasia*
8b. Flowers 4–9 mm. long; standard porrect to ascending; standard rarely erect.
11a. Seeds estrophiolate, but with a squamiform, papyraceous caruncle; bracteoles present.
12a. Pod not uncinate; stamens diadelphous (in *Glycine* sometimes incompletely so), all fertile.
13a. Upper two calyx-teeth completely united; bracts striate, persistent ---------- *Shuteria*
13b. Upper two calyx-teeth free at least toward the apex; bracts rarely striate, often deciduous.
14a. Leaflets 3; calyx-lobes acuminate to acute, not margined nor petaloid; style deciduous, not indurated: standard glabrous; hilum not encircled by a membranaceous collar.

15a. Calyx truncate or inflexed at the base, the tube glabrate, the teeth often only setose-ciliate, sericeous within, the upper pair united only toward the base; bractlets (up to 3.5 mm. long) and bracteoles (up to 2.5 mm. long) mostly setaceous, ± stiff and persistent; pedicels conspicuously nodose and articulate at the base.
*Teyleria* (p. 77)

15b. Calyx tapering at the base, the tube and teeth usually evenly pubescent, glabrous within, the upper pair united to the middle or above; bractlets and bracteoles usually shorter and broader, membranaceous, and caducous; pedicels inconspicuously if at all nodose or articulate at the base----------*Glycine* (p. 9)

14b. Leaflets 5–7, only occasionally 3; calyx-lobes obtuse, widely margined, petaloid; style persistent, indurated in fruit; standard sericeous on the back toward the apex; hilum encircled by a membranaceous collar; genus restricted to Madagascar.
*Pseudoglycine* (p. 74)

12b. Pod uncinate; stamens monadelphous, the alternate ones sterile----------*Teramnus*

11b. Seeds with a conspicuous cartilaginous, arilloid strophiole.

16a. Bracteoles absent; calyx-teeth much shorter than the tube; restricted to Australia---*Hardenbergia*

16b. Bracteoles present: calyx-teeth equaling the tube or longer; extra-Australian genera.

17a. Twining vines; bracts and bractlets not accrescent, membranaceous; more or less deciduous, inflorescence not capituliform; leaflets 1–7; pod usually elongate-oblong to linear and several-seeded--------*Paraglycine* (p. 52)

17b. Erect herbs or subshrubs; bracts and bractlets accrescent, stiff, persistent, linear-setaceous; inflorescence capituliform; leaflets 1–3; pod oval, 2-seeded----------*Pseudoeriosema*

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## Systematic List of Glycine and Its Immediate Allies

### Glycine

Subgenus LEPTOCYAMUS

| | |
|---|---|
| 1. Glycine clandestina Wendl. | Australia; Formosa; Micronesia |
| 1a. var. sericea Benth. | Australia |
| 2. G. falcata Benth. | Australia |
| 3. G. latrobeana (Meissn.) Benth. | Australia |
| 4. G. canescens F.J.Herm. | Australia |
| 5. G. tabacina (Labill.) Benth. | Australia; S. China; S. Pacific Islands |
| 6. G. tomentella Hayata | Australia; S. China; Philippines; Formosa |

Subgenus GLYCINE

| | |
|---|---|
| 7. G. petitiana (A.Rich.) Schweinf. | Ethiopia |
| 8. G. javanica L. | India; Malaya |
| 8a. subsp. micrantha (Hochst.) F.J.Herm. | Trop. Africa |
| 8b. var. claessensii (De Wild.) Hauman | Uganda to Nyasaland |
| 8c. var. paniculata Hauman | Belgian Congo |
| 8d. var. longicauda (Schweinf.) Bak. | Ethiopia to Angola |
| 8e. var. moniliformis (Hochst.) F.J.Herm. | Ethiopia and Eritrea |
| 8f. subsp. pseudojavanica (Taub.) Hauman | Belgian Congo to Angola |
| 8g. var. laurentii (De Wild.) Hauman | Belgian Congo |

Subgenus SOJA

| | |
|---|---|
| 9. G. ussuriensis Regel & Maack. | Asia |
| 10. G. max (L.) Merr. | Cultigen |

### Paraglycine

Section DIGITATAE

| | |
|---|---|
| 1. Paraglycine unifoliolata (Bak.f.) F.J.Herm. | Angola and N. Rhodesia |
| 2. P. unicostata F.J.Herm. | N. Rhodesia |
| 3. P. upembae (Hauman) F.J.Herm. | Belgian Congo |
| 4. P. digitata (Harms) F.J.Herm. | Tanganyika |
| 5. P. radicosa (A.Rich.) F.J.Herm. | N. Rhodesia, Nyasaland, and Ethiopia |
| 5a. var. rufescens (Hauman) F.J.Herm. | N. Rhodesia to Kenya |
| 5b. var. enneaneura (Hauman) F.J.Herm. | Belgian Congo and N. Rhodesia |

Section HEDYSAROIDES

| | |
|---|---|
| 6. P. hedysaroides (Willd.) F.J.Herm. | Guinea to Angola |
| 7. P. laotica (Gagnep.) F.J.Herm. | Laos |
| 8. P. pinnata (Merr.) F.J. Herm. | China |
| 9. P. pentaphylla (Dalz.) F.J.Herm. | India |
| 10. P. madagascarensis F.J.Herm. | Madagascar |

**Pseudoglycine**

| | |
|---|---|
| Pseudoglycine lyallii (Benth.) F.J.Herm. | Madagascar |

**Teyleria**

| | |
|---|---|
| Teyleria koordersii (Backer) Backer | China and Java |

## Glycine L.

*Glycine* L., Sp. Pl. 753. 1753.

Perennial herbs except for *G. max* (L.) Merr. which is annual; more or less hirsute or strigose to glabrate (never setose). Stems twining, climbing, or procumbent or rarely (in *G. max*) erect, occasionally somewhat woody at the base. Leaves trifoliolate, usually pinnate (digitate in three Australian species), nonpunctate, the stipules small, often deciduous. Flowers small, in axillary, solitary (not geminate) racemes (rarely in a terminal panicle or occurring also singly or in a sessile fascicle in the lower axils) inserted singly along the rachis of the raceme (subgenus *Leptocyamus*) or fascicled along the rachis; the peduncle bracteate, a bractlet also inserted at the base of the pedicel and a pair of bracteoles at the base of the calyx (in the subgenus *Glycine* the fascicles also bracteate), neither the bractlets nor bracteoles accrescent. Pedicels not nodose and articulate at the base or obscurely so. Calyx five-toothed, subbilabiate, the upper pair of teeth more or less connate, the lower three lanceolate to setaceous. Corolla papilionaceous, from scarcely exceeding the calyx to twice its length, white to blue or purplish, glabrous, the petals long-clawed. Standard suborbicular to obovate or rhomboid (not panduriform), subauriculate at the base. Wings narrow, more or less adherent to the keel. Keel shorter than the wings, obtuse, not twisted. Stamens all fertile and isomorphic, included, monadelphous, or diadelphous by the freeing of the vexillar stamen with age. Ovary subsessile, several- to many-ovuled. Style short, slender, slightly incurved. Stigma terminal, capitate. Pod linear or oblong, straight or falcate, more or less cellulose-septate between the seeds, compressed to subcylindrical, unilocular, 2-valved, the valves dehiscing spirally, apiculate but not clearly uncinate; seeds ovoid or oblong to subspherical, estrophiolate, with a short, lateral hilum and a small, scalelike, papyraceous caruncle.

Type species: *Glycine javanica* L., Sp. Pl. 753. 1753.

Ten species native to tropical and warm-temperate Africa and Asia, except for *G. max* which is known only in cultivation. None of the species are native to the New World.

Characteristics distinguishing *Glycine* from its nearest allies are: Leaves invariably trifoliolate; vesture not bristly spreading; inflorescence not geminate; pedicels not nodose and articulate at the base or only obscurely so; bractlets and bracteoles not accrescent; corolla always glabrous; petals long-clawed; standard suborbicular to rhomboid, not panduriform; seeds estrophiolate, carunculate; caruncle a membranaceous, scalelike flap.

*Key to Subgenera*

1a. Flowers not clustered, inserted singly along the elongated rachis of the raceme (single flowers, generally cleistogamous, also often in the lower leaf-axils)----------1. Subgenus *Leptocyamus* (p. 10)

1b. Flowers clustered along the rachis of the raceme, or inserted irregularly on the rachis of a greatly shortened raceme or in the axils of the leaves.

2a. Pod at maturity obliquely constricted (almost septate) between the seeds, narrow, usually straight, 3- to 8-seeded; flowers fasciculate along the elongated rachis of the raceme, with a bract at the base of the fascicle-----2. Subgenus *Glycine* (p. 24)

2b. Pod not constricted between the seeds, rather broad, straight or curved, 2- to 4-seeded; flowers in axillary clusters or short racemes, without a fascicle-bract----3. Subgenus *Soja* (p. 36)

## 1. Subgenus **Leptocyamus** (Benth.) F.J.Herm.

*Leptocyamus* Benth. (as genus), Linn. Soc. London, Trans., Bot. 18:209. 1839.

*Leptocyamus* Benth. (as section), Fl. Austral. 2:243. 1864.

*Leptolobium* Benth. (as genus), Ann. Wien Mus. 2:113. 1838, not Vog. 1837.

Species of this subgenus are confined to Australia, the South Pacific islands, Philippine Islands, and southern China. They differ from those of the other subgenera in having the flowers inserted singly, rather than in clusters, on the rachis of an elongated raceme, and (except in *G. falcata*), in regularly having additional, generally cleisto-

gamous, flowers solitary or clustered in the lower axils. Three of the species also have digitately trifoliolate leaves, a condition not found in the other subgenera. The seeds are usually of two types within each species, very different in appearance, one smooth and often glossy, the other variously muriculate or papillose and foveolate. The latter condition is due to the true seed coat being covered by the dried, persistent remains of the perisperm, which otherwise remains attached to the inner wall of the pod. As it partially disintegrates upon the seed-surface it shrivels in definite patterns usually forming tubercles or, in the case of *G. tomentella*, becoming foveolate as well as papillose.

### Key to Subgenus *Leptocyamus*

1a. Leaves digitately trifoliolate, the three leaflets equally petiolulate.
  2a. Stems, elongate, twining---------- 1. *G. clandestina*
  2b. Stems short, erect, decumbent or ascending, not twining.
    3a. Leaflets oblong-lanceolate or oblong, 1–6 cm. long, coriaceous, gray-green, coarsely net-veined beneath; no single or clustered flowers in the lower leaf-axils; upper calyx-teeth free above the middle; pods falcate, reflexed. 2. *G. falcata*
    3b. Leaflets obovate or suborbicular, 0.7–2 cm. long, membranaceous; flowers in the lower leaf-axils solitary or fasciculate; upper calyx-teeth united nearly to the tip; pods straight, ascending---------- 3. *G. latrobeana*
1b. Leaves pinnately trifoliolate, the terminal leaflet inserted at some distance from the lateral ones.
  4a. Plant hoary; leaflets canescent, silky-strigose, linear to narrowly oblong-lanceolate, 2–6 cm. long, acute--- 4. *G. canescens*
  4b. Plant not hoary; leaflets strigose, velvety-tomentose or glabrous, at least some of the leaflets usually obovate or oval, obtuse.
    5a. Stems strigose to glabrous, slender; leaflets of the lowest leaves usually broadly obovate to oval, obtuse, those of the upper ones elliptic-lanceolate to linear, acute; calyx-teeth lanceolate, strigose to glabrous, equaling or shorter than the tube---------- 5. *G. tabacina*
    5b. Stems tomentose-villous, generally coarse; leaflets all ovate to oblong-elliptic, obtuse; calyx-teeth lanceolate-attenuate to setaceous, hirsute, longer than the tube-- 6. *G. tomentella*


FIGURE 1.—Glycine clandestina Wendl.

(*C. E. Hubbard 4712*–Kew) Plant × ½. Flower × 2. Pods, leaf × 1±. Seeds × 1 (small), × 5 (large).

1. **Glycine clandestina** Wendl. (Fig. 1)

*Glycine clandestina* Wendl., Bot. Beobacht. 54. 1798.

*G. minima* Willd., Enum. 756. 1809.

*Teramnus clandestinus* (Wendl.) Spreng., Syst. Veg. 3: 235. 1826.

*Leptolobium clandestinum* (Wendl.) Benth., Ann. Wien Mus. 2: 125. 1838.

*L. microphyllum* Benth., Ann. Wien Mus. 2: 125. 1838.

*Leptocyamus microphyllus* Benth., Linn. Soc. London, Trans., Bot. 18: 209. 1839.

*L. clandestinus* (Wendl.) Benth. *in* Hook.f., Fl. Tasm. 1: 102. 1860.

?*Glycine pescadrensis* Hayata, Ic. Pl. Formos. 9: 26. 1920.

Stems slender, twining, from retrorse-hirsute (especially below the nodes) to glabrate, arising from a stout, woody rootstock; *leaves* digitately trifoliolate, their petioles 5–40 mm. long, sparsely retrorse-hirsute or strigose to glabrous; *stipules* oblong, bluntish, prominently 3-veined, mostly 1.5–3 mm. long; *leaflets* commonly oblong-lanceolate (the lower often broadly obovate), but occasionally oval to broadly elliptic or linear, thin-membranaceous, 1–4 cm.×4–10 mm., acute to obtuse and mucronulate, rounded to tapering at the base, more or less strigose especially beneath and on the midvein above, their petiolules about 1 mm. long, hirsute, the stipels minute (0.5 mm.); *bracts* narrowly oval, nerved, 1.5–2 mm. long; *racemes* in the upper axils slender, usually exceeding the leaves, loosely few–several (4–12)-flowered, 1–6 cm. long, on peduncles 2–5 cm. long; *bractlets* setaceous, more or less strigose, 1.5–2 mm. long, from one-half the length of the pedicels to equaling them; *flowers* of the racemes 6–7 mm. long, on slender pedicels from less than half the length to equaling the calyx, inserted singly on the rachis; *calyx* 3–4 mm. long, glabrate to moderately strigose, the lanceolate to subulate teeth from ⅔ to equaling the tube, the upper pair united for ½ to ¾ their length, the bracteoles from ½ to equaling the tube; *corolla* light blue to violet, the standard obovate, ascending-reflexed, from slightly to conspicuously exceeding the wings, the keel much longer (averaging 2 mm.) than the wings; *flowers in the lower axils* solitary or fasciculate, their petals often rudimentary or wanting; *pod* linear to short-oblong or oval, compressed, 12–30 mm. long, 3–4 mm. wide, 4- to 8-seeded, sparsely hirsute to glabrate, the margins somewhat thickened; *seeds* short-oblong to suborbicular, 1.5×1–1.25 mm., dark brownish red, smooth or muriculate, the caruncle an erect, membranaceous, scalelike, straw-colored flap.


FIGURE 2.—Glycine falcata Benth.
(*S. Helms 1028*–Copenhagen Mus.) Plant × ½. Leaf detail × 1±. Flower × 2. Pod × 1. Seeds × 1 (small), × 2½ (large).

Throughout Australia (except North and central Australia), Tasmania; also Formosa and Micronesia (?). An extremely variable species. It is much less common than the following variety.

1a. **Glycine clandestina** var. **sericea** Benth.

*Glycine clandestina* var. *sericea* Benth., Fl. Austral. 2:244. 1864.

In its extreme form quite distinct in its densely rusty-hirsute or rusty-strigose calyx, shorter, more compact racemes, the flowers on shorter, stouter pedicels and its generally elongated, narrowly

linear leaflets, up to 5 cm. long, which are often revolute. The pods are often longer, rather than shorter as thought by Bentham,[19] up to 4 cm. long, and occasionally densely hirsute. Intermediates in one to several of these characteristics are frequent, however. It appears to be the only form in Western Australia and the dominant one in South Australia.

No material of *Glycine pescadrensis* Hayata has been available for study. From the original description, however, and from examination of a photograph of the type specimen in the Arnold Arboreum Herbarium it appears that Hosokawa [20] is correct in reducing it to the synonymy of *G. clandestina*. He reports it from Micronesia (Marianas) in addition to Formosa.

## 2. **Glycine falcata** Benth. (Fig. 2)

*Glycine falcata* Benth., Fl. Austral. 2: 243. 1864.

Stems short, erect, ascending or decumbent, not twining, retrorse-strigose, from a fibrous, woody rootstock; *leaves* digitately trifoliolate, their petioles 1.5–7 cm. long, stoutish, retrorse-strigose; *stipules* lanceolate, coriaceous, strongly several-nerved, antrorse-strigose, 3–5 mm. long; *leaflets* oblong to oblong-lanceolate or occasionally oval, gray-green, thick and coriaceous, 1–6 cm. long, 5–20 mm. wide, obtuse, usually apiculate, tapering at the base, strigose beneath, sparsely so above, conspicuously net-veined beneath, their petiolules very short (1 mm. or less), stout, and hispid, the stipels acicular, 1 mm. long; *racemes* axillary, much exceeding the leaves, rather loosely 2- to 10-flowered, 1–6 cm. long, on stout strigose peduncles 2–12 cm. long; *bractlets* setaceous, hirsute, 1.5 mm. long, somewhat exceeding pedicels; *flowers* 5.5–6.5 mm. long, on stoutish, hirsute pedicels (1–1.5 mm. long) which are shorter than the calyx, inserted singly on the rachis; *calyx* 3.5–4 mm. long, strigose, the teeth lanceolate to subulate, equaling or slightly exceeding the tube, the upper pair free above the middle, the braceteoles from one-half to equaling the tube; *corolla* light blue to pale mauve, the standard narrowly obovate, slightly exceeding the wings, the keel much shorter than the wings; *pod* reflexed, falcate, 15–20 mm. long, 4 mm. wide, biconvex, 2- to 3-seeded, the valves rigid, hirsute-strigose, with a rigid apiculation 2 mm. long; *seeds* oblong to ovoid-oblong, sometimes truncate at one end, 4–4.5×2 mm., olive-green to brown, mottled with purple,

[19] See footnote 11, p. 4.

[20] HOSOKAWA, TAKAHIDE. [SYNONYMY OF G. CLANDESTINA.] Nat. Hist. Soc. Formosa, Trans. 25: 18, illus. 1935.

smooth, glossy, or dull, the ligulate caruncle very narrow, short, and often inconspicuous.

North Australia, Queensland, and South Australia; evidently infrequent.


FIGURE 3.—Glycine latrobeana (Meissn. *in* Lehm.) Benth. (*A. Morrison 4062*–Kew) Plant × ½. Branch detail × 1±. Flowers × 2½.

3. **Glycine latrobeana** (Meissn. *in* Lehm.) Benth. (Fig. 3)

*Glycine latrobeana* (Meissn. *in* Lehm.) Benth., Fl. Austral. 2:244. 1864.

*Zichya latrobeana* Meissn. *in* Lehm., Pl. Preiss. 1:94. 1844.

*Leptocyamus tasmanicus* Benth. *in* Hook.f., Fl. Tasm. 1:102, t. 17. 1860.

Stems short, decumbent or ascending or the tips somewhat twining, hirsute, the hairs often somewhat retrorse but the pubescence sometimes strigose and either retrorse or antrorse, the rootstock woody, fibrous, sometimes irregularly thickened; *leaves* digitately trifoliolate, their petioles 1–3.5 cm. long, slender, hirsute to reflexed-strigose; *stipules* suborbicular to broadly ovate or reniform, 1.5–2 mm. long, as wide as long or wider, very blunt, strongly several-nerved, glabrous to sparsely strigose; *leaflets* all obovate or suborbicular (often elliptic before maturity), thin, 7–20 mm. long, 4–12 mm. wide, obtuse to retuse, cuneate at the base, glabrous above, silky-strigose beneath, their petiolules 1 mm. long, hirsute, the stipels minute and early caducous; *inflorescences* axillary, mostly in the form of usually rather compactly 3- to 8-flowered racemes 7–20 mm. long, on very long (6–10 cm.), slender, hirsute peduncles; *bractlets* elliptic to broadly ovate, blunt, strigose, 0.5–1.25 mm. long, equaling to exceeding the pedicels; *inflorescences* consisting of a single flower also frequently occur in the lower axils; *flowers* 7–9 mm. long, on very short (0.5–1 mm.), hairy pedicels, inserted singly on the rachis; *calyx* 2.5–6 mm. long, densely ferrugineous-strigose, the teeth deltoid to narrowly lanceolate, equaling to somewhat shorter than the tube, the upper pair united nearly to the tip, bracteoles minute, one-fourth the length of the calyx-tube or less, strigose; *corolla* purple, the standard broadly obovate, abruptly reflexed, somewhat exceeding the wings, the keel much shorter than the wings; *pod* not seen, said to be like that of *G. clandestina*.

Victoria, New South Wales, South Australia, and Tasmania. Open grassland; apparently not common.


FIGURE 4.—Glycine canescens F.J.Herm.
(*M. Koch 229*–Naturhist. Mus. Vienna) Plant × ½. Leaves × 1. Flowers × 2. Pod × 1. Seeds × 5.

4. **Glycine canescens** F.J.Herm. (Fig. 4)

*Glycine canescens* F.J.Herm., nom. nov.

*Leptocyamus sericeus* F. Muell. *in* Hook., Kew Jour. 8: 45. 1856, and Trans. Phil. Inst. Vict. 1: 40. 1856(?).

*Glycine sericea* (F. Muell. *in* Hook.) Benth., Fl. Austral. 2: 245. 1864, not Willd. 1802.

*G. sericea* var. *orthotricha* J. M. Black, Fl. South Austral. 326. 1924.

Stems elongated and usually slender, either trailing or twining, the whole plant hoary, sericeous-strigose, or, rarely, hirsute; *leaves* pinnately trifoliolate, their petioles 3–22 mm. long, the rachis 1–8 mm. long; *stipules* acicular, 2–3.5 mm. long, strigose; *leaflets* elliptic-linear to narrowly oblong-lanceolate, thin, 2–6 cm. long, 2–8 mm. wide, acuminate to abruptly acute and mucronate, tapering at the base, more or less silky-strigose on both surfaces, their petiolules 1 mm. long, hirsute, the stipels 0.5–1 mm. long, acicular; *inflorescence* axillary, mostly racemose, 2–4 cm. long, loosely 6- to 10-flowered, on generally long (3–7 cm.), slender peduncles; *bractlets* setaceous, 1.5–2 mm. long, strigose-hirsute, exceeding the pedicels; single-flowered or geminate inflorescences also frequent in the lower axils; *flowers* 7–9 mm. long, on hirsute pedicels 1–2 mm. long, inserted singly on the rachis; *calyx* 4–4.5 mm. long, densely ferrugineous-canescent-strigose, the teeth lanceolate to narrowly lanceolate, equaling or slightly exceeding the tube, the upper pair united to about the middle, bracteoles setaceous, 1 mm. or less long, strigose, appressed, inconspicuous; *corolla* purple to bluish, the standard narrowly obovate, reflexed, the oblong wings about 1 mm. shorter than the standard but much exceeding the obovate keel; *pod* linear, 2.5 (rarely 1.5)–3.5 cm. long, 3–4 mm. wide, sericeous-strigose, somewhat compressed, and occasionally more or less torulose, 5- (rarely 2-) to 7-seeded; *seeds* 2.5–3.5×2.5 mm., short-oblong to quadrate, the corners usually rounded, smooth and shining or muriculate, olive-brown to dark-brownish purple, the scarious, ligulate caruncle conspicuous.

Northwestern Victoria, western New South Wales, Queensland, Central, North, South, and Western Australia. Reported to be good fodder.

FIGURE 5.—Glycine tabacina (Labill.) Benth.
(*C. E. Hubbard 8482*–Kew) Plant × ½. Leaves × 1±. Flower detail × 2½. Seeds × 2.

5. **Glycine tabacina** (Labill.) Benth. (Fig. 5)

*Glycine tabacina* (Labill.) Benth., Fl. Austral. 2: 244. 1864.

*Kennedya tabacina* Labill., Sert. Aust.-Caled. 70, t. 70. 1824.
*Leptolobium elongatum* Benth., Ann. Wien Mus. 2: 125. 1838.
*L. tabacinum* (Labill.) Benth., Ann. Wien Mus. 2: 125. 1838.
*Leptocyamus elongatus* Benth., Linn. Soc. London, Trans., Bot. 28: 209. 1839.
*L. latifolius* Benth. *in* Mitch., Jour. Exped. Trop. Austral. 361. 1848.
*Desmodium novo-hollandicum* F. Muell., Linnaea 25: 394. 1851.
*Glycine tabacina* var. *latifolia* Benth., Fl. Austral. 2: 245. 1864.
*G. tabacina* var. *uncinata* Benth., Fl. Austral. 2: 245. 1864.
*?G. koidzumii* Ohwi, Act. Phytotaxon. & Geobot. 12: 110. 1943.

Stems slender and elongated, usually creeping or trailing, occasionally twining, more or less retrorsely strigose (rarely strigose-hirsute) to glabrous, the vesture usually white, from a woody, often thickened, rootstock; *leaves* pinnately trifoliolate, their petioles 5–45 mm. long, the rachis 1–4 mm. long; *stipules* deltoid to oblong-lanceolate, 1.5–3 mm. long, obtuse to acuminate, coarsely several-ribbed, sparsely strigose to glabrous; *leaflets* thin, generally more or less strigose beneath, sparingly strigose to glabrous above, the terminal often larger or longer than the lateral, those of the lower leaves usually broadly obovate to oval, 10–15×8–14 mm., obtuse to truncate, occasionally emarginate, apiculate or acute, tapering at the base, often prominently net-veined beneath, leaflets of the upper leaves usually elliptic-lanceolate to narrowly oblong-lanceolate or linear, 7–50 mm. long, 3–7 mm. wide, acute to blunt and apiculate, abruptly tapering to rounded at the base, their petiolules 1–2 mm. long, hirsute, the stipels acicular, 1–1.5 mm. long, occasionally all of the leaves oval to broadly oblong, 20–40 mm. long, 10–20 mm. wide; *racemes* in the upper axils slender, elongate, 2–8 cm. long, loosely 4–12(23)-flowered, on sparsely strigose to glabrous peduncles 2–12 cm. long; *bractlets* subulate, 1–2 mm. long, exceeding the pedicels; *in the lower axils the flowers* often solitary or in few-flowered fascicles; *flowers* 6–8 mm. long, on strigillose pedicels 0.5–2 mm. long, or frequently subsessile, inserted singly on the rachis, sometimes 2 cm. apart; *calyx* 3–4.5 mm. long, usually sparsely strigose to glabrous, occasionally densely strigose or short-hirsute, the teeth from broadly to narrowly lanceolate, equaling or shorter than the tube, the upper pair united to the middle or above, bracteoles acicular to setaceous, 1.5–2 mm. long; *corolla* blue to violet or purplish, the standard obovate, reflexed to ascending, slightly longer than the obovate-oblong wings which conspicuously exceed the keel; *pod* linear, 14–30 mm. long, 3–3.5 mm. wide, sparsely strigose (hirsutulous on the ridges) to glabrous, occasionally hirsute, compressed, the

FIGURE 6.—Glycine tomentella Hayata

(*R. Oldham 196*–Naturhist. Mus. Vienna) Plant × ½. Leaflet × 1. Flowers × 5. Pod × 1. Seeds (P.I. 253238) × 2½.

persistent style variously hooked or curved (but not thickened and upturned at a right angle as in *Teramnus*), 3- to 6-seeded; *seeds* 1.75–3×1.75 mm., oblong to ovoid, often truncate at the ends, smooth and dull to glossy, muriculate, purplish black, the caruncle an erect, scarious scale.

Temperate Australia (Victoria, New South Wales, Queensland, South, and Western Australia), South Pacific Islands (Tonga, Fiji,

New Caledonia) and Fukien Province, China. Rocky pastures, clearings, dry hillsides, and sandy slopes.

Extremely variable, the two varieties nomenclatorially designated by Bentham [21] evidently no more consistent or frequent than many others, so that their maintenance seems impracticable.

No material of *Glycine koidzumii* Ohwi, described from the Ryukyu Islands, was available for study. From the original description it would appear to be very close to, if not synonymous with, the highly polymorphic *G. tabacina* rather than with *G. pescadrensis* (=*G. clandestina*) with which it was thought to be allied by its author.

### 6. **Glycine tomentella** Hayata (Fig. 6)

*Glycine tomentella* Hayata, Ic. Pl. Formos. 9: 29. 1920.

*Leptolobium tomentosum* Benth. *in* Ann. Wien Mus. 2: 125. 1838.

*Leptocyamus tomentosus* Benth. *in* Linn. Soc. London, Trans., Bot. 18: 209. 1839.

*Glycine tomentosa* Benth., Fl. Austral. 2: 245. 1864, not L., Sp. Pl. 754. 1753.

Stems prostrate, trailing or climbing over shrubs, usually stouter (2 mm. in diameter) than those of *Glycine tabacina*, tomentose-villous, the vesture usually tawny; *leaves* pinnately trifoliolate, their villous-hirsute petioles 1–9 cm. long, the rachis 2–9 mm. long; *stipules* ovate to lanceolate, 2–3 mm. long, coarsely several-ribbed, densely pubescent to glabrate; *leaflets* oblong, elliptic to oval or ovate, thin, 14–65 mm. long, 8–35 mm. wide, the terminal generally larger than the lateral, obtuse and usually mucronate, sometimes emarginate, abruptly tapering or rounded at the base, more or less velvety-tomentose to strigose on both surfaces, their petiolules 0.5–1.5 mm. long, hirsute, the stipels 0.75–1.5 mm. long acicular; *racemes* in the upper axils, 0.75–3 cm. long, from compactly to loosely 7- to 15-flowered, on hirsute peduncles 3.5–10 cm. long; *bractlets* setaceous, 1.5–2 mm. long, exceeding the pedicels, from densely to sparsely hirsute; flowers frequently solitary, geminate, or in few-flowered fascicles in the lower axils; *flowers* 5–7 mm. long, on hirsute pedicels 0.5–1.5 mm. long, inserted singly on the rachis; *calyx* 3.5–6 mm. long, hirsute to densely hirsute (the hairs sometimes more or less appressed-ascending on the tube) or rarely strigose, the teeth lanceolate and usually narrowly attenuate at the apex to setaceous, longer than the tube (2.5–3.5 mm. long), the upper pair united to about the middle, bracteoles setaceous, 1.5–2 mm. long, usually appressed; *corolla* purple to mauve or reddish, the standard obovate, ascending, longer than the obovate-oblong wings which exceed

[21] See footnote 11, p. 4.

the keel; *pod* linear, 12–23 mm. long, 2.75–3.5 mm. wide, hirsute to glabrate, compressed, 3–7-seeded; *seeds* 1.75–2.25×1.25–2 mm., short-oblong to quadrate, usually truncate at both ends, subcylindrical at maturity, smooth or muriculate or papillose and foveolate, purplish-black (or, when foveolate, dull gray-brown), the caruncle an erect, brownish-orange, scarious scale.

North Australia, Queensland, New South Wales, New Guinea, New Caledonia, Philippine Islands (Luzon), southern China (Fukien Province) and Formosa. On river banks, dry slopes, and in open woods.

Extremely variable. Occasional intermediates between this and *Glycine tabacina* occur which are difficult to refer with certainty to either one or the other. But as a rule the divaricate, rather than appressed, pubescence of *G. tomentella*, particularly on the stems and the teeth of the calyx, its more densely pubescent calyx with more slender teeth that are longer than the tube and the flowers tending to be approximate toward the apex of the peduncle readily set it off from *G. tabacina;* and when the latter has developed its characteristic lanceolate to linear upper leaves, in addition to the broadly oval lower leaves common to both species, there can be no mistake as the former are not found in *G. tomentella.*

## 2. Subgenus **Glycine** L.

*Glycine* L. (as genus), Sp. Pl., 753. 1753, *pro parte.*
*Notonia* Wight & Arn. (as genus), Prodr. 1: 207. 1834, not DC. 1833.
*Johnia* Wight & Arn. (as genus), Prodr. 1: 449. 1834, not Roxb. 1832; Taub. (as section) *in* Engl. & Prantl, Die Natürl. Pflanzenf. 3(3): 360. 1894.
*Javanicae* Harms (as section) *in* Engl., Pflanzenw. Afr. 3(1): 654. 1915, *pro parte.*

Species of this subgenus are entirely African except for the typical form of *Glycine javanica* which is native to southeastern Asia. They are set off from the rest of the genus by the possession of a bract at the base of the fascicles (fig. 7), from species of the subgenus *Leptocyamus* by having the flowers in clusters of two to several along the rachis of the raceme instead of inserted singly, and from species of the subgenus *Soja* in having the racemes not greatly reduced and in having the mature pods narrow, usually straight, 3- to 8-seeded and conspicuously constricted (almost obliquely septate) between the seeds. There are but two species, with two well-marked subspecies and several varieties of *G. javanica* which has long been taken as the type of the genus.

Key to Subgenus *Glycine*

1a. Fascicle-bract conspicuous, ovate to lanceolate, often incised or parted, usually persistent; flowers large, 8–10 mm. long; pubescence densely velutinous (Ethiopia and Kenya).
7. *G. petitiana*

1b. Fascicle-bract inconspicuous (except in the bud), narrowly linear to setaceous, usually caducous; flowers small, 4–6(7) mm. long; pubescence strigose to hirsute.

2a. Ovary and pod strigose or hirsute.

3a. Racemes short, stout and congested, many (70–160)-flowered, tapering to an acute apex until the slowly elongating rachis reaches maturity; flowers before maturity conspicuously overtopped by the long (3.5–5 mm.) fascicle-bract and setaceous calyx-teeth; calyx teeth three times the length of the tube (India and Malaya)_____8. *G. javanica*

3b. Racemes elongated, not short, stout or congested, the flowers (20–100) for the most part blooming at the same time; flowers not conspicuously overtopped by the short fascicle-bract (1.5–2.5(4) mm. long) or calyx-teeth; calyx-teeth twice the length of the tube or less (Africa).

4a. Flowers mostly 4.5–7 mm. long, the corolla usually conspicuously exceeding the calyx; racemes not conspicuously slender, or widely interrupted; pods mostly 3.5–5 mm. wide, constricted between the seeds but scarcely moniliform.

5a. Racemes simple, nearly always axillary.

6a. Racemes seldom exceeding 20 cm. in length; leaflets and petioles generally less than 8 cm. long; flowers 4.5–6 mm. long, the standard suborbicular.

7a. Pubescence of stems, petioles and peduncles appressed, usually retrorse; upper surface of leaflets sparsely strigose, the lower surface pubescent chiefly on the nerves; leaflets acute or acuminate.
8a. *G. javanica* subsp. *micrantha*

7b. Pubescence of stems, petioles and peduncles comparatively dense, the hairs erect or ascending; leaflets more or less velutinous on both surfaces; leaflets mostly obtuse.
8b. *G. javanica* subsp. *micrantha* var. *claessensii*

6b. Racemes up to 40 cm. long, the fascicles many-flowered; leaflets and stout petioles usually more than 10 cm. long; flowers 6–7 mm. long, the standard rhomboid.
8c. *G. javanica* subsp. *micrantha* var. *mearnsii*

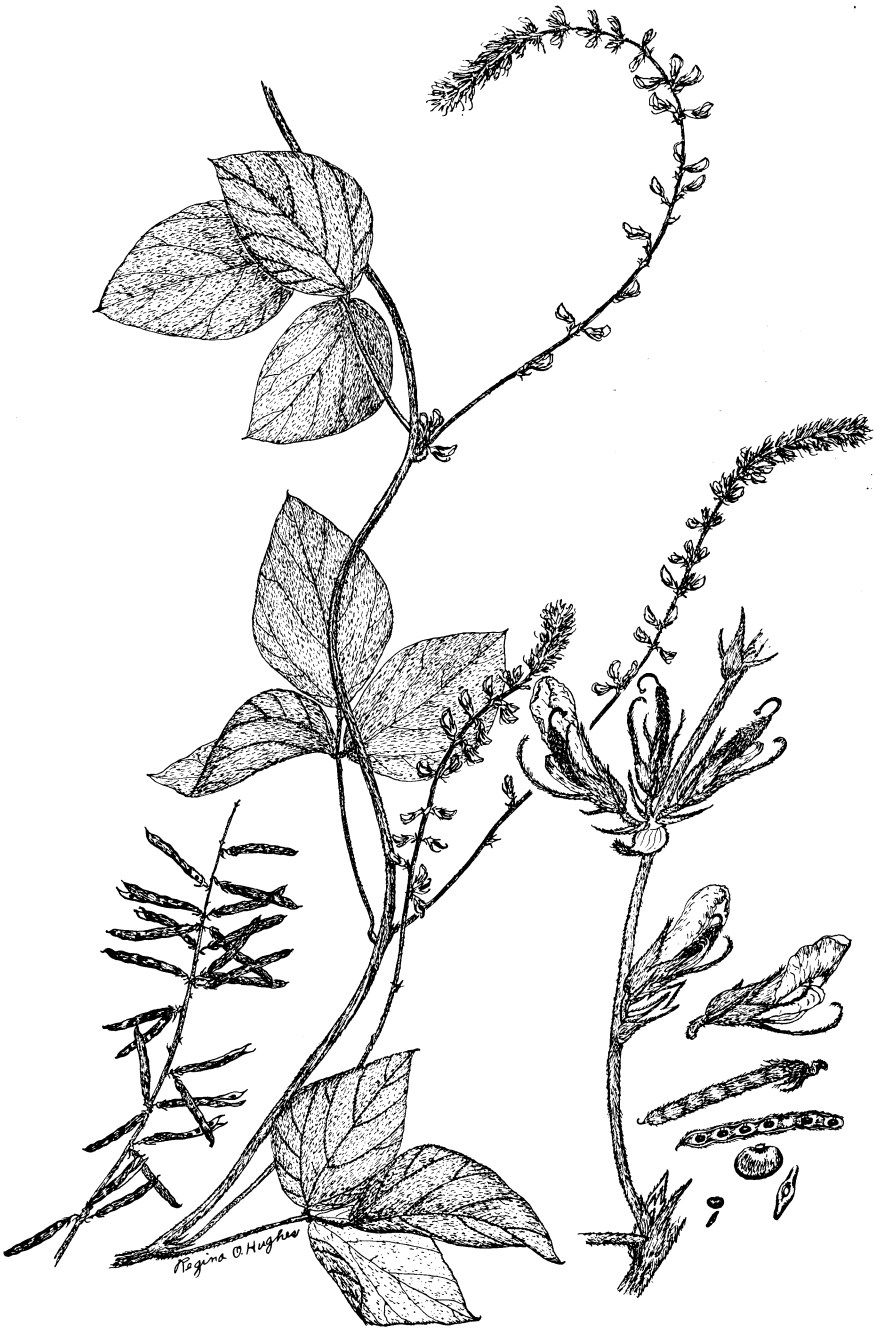


FIGURE 7.—Glycine petitiana (A. Rich.) Schweinf. *in* Oliver.

(*Adamson 678*; pods, *H. F. Mooney 5062*–Kew) Plant × ½. Enlarged flowering raceme (showing fascicle-bracts) × 2½. Flower × 2½. Fruiting raceme × ½. Pod × 1. Seeds × 2.

5b. Racemes compound, terminal, up to 60 cm. long, the branches 25–30 cm. long.

8d. *G. javanica* subsp. *micrantha* var. *paniculata*

4b. Flowers 4–5 mm. long; racemes slender, lax, elongated (25–40 cm. long) and interrupted.

8a. Plant glabrescent; leaflets very large (12–15 cm. long) and thin.

8e. *G. javanica* subsp. *micrantha* var. *longicauda*

8b. Plant cinereous-strigose; leaflets seldom over 6 cm. long; corolla scarcely exceeding the calyx; pods 3 mm. wide, moniliform.

8f. *G. javanica* subsp. *micrantha* var. *moniliformis*

2b. Ovary and pod glabrous or glabrate.

9a. Hirsute or villous vine; pedicels 0.75–2.5 mm. long; flowers 4.5–6 mm. long; standard suborbicular.

8g. *G. javanica* subsp. *pseudojavanica*

9b. Glabrescent vine; pedicels 1–1.5 mm. long; flowers 3.5–4.5 mm. long; standard cuneiform to subauriculate above the claw.

8h. *G. javanica* subsp. *pseudojavanica* var. *laurentii*

7. **Glycine petitiana** (A. Rich.) Schweinf. *in* Oliver (Fig. 7)

*Glycine petitiana* (A. Rich.) Schweinf. *ex* Baker *in* Oliver, Fl. Trop. Afr. 2:179. 1871.

*Johnia petitiana* A. Rich., Tent. Fl. Abyss. 1:210, t. 40. 1847.

A climbing vine from a somewhat woody base; *stems* terete to angular, often quite stout (the flowering portion may be 3.5 mm. in diameter), densely ferrugineous-velutinous to tomentose; *leaves* pinnately trifoliolate, their petioles 2–6 cm. long, hirsute to sericeous-tomentose, the rachis 1–10 mm. long; *leaflets* extremely variable in shape, sometimes oblong-oval with an obtuse, mucronulate apex and subcuneate base, sometimes broadly ovate, the apex acuminate to abruptly acute and mucronate, the base rounded, or the outline occasionally elliptic-lanceolate, 2.5–7 cm. long, 1–6 cm. wide, velutinous to thinly strigose above, velutinous to sericeous-strigose beneath, the nerves ferrugineous, on petiolules 1–2.5 mm. long; *bracts* lanceolate to lance-acuminate, 3.5–9 mm. long, densely strigose; the *flowers* distinctly whorled in axillary, peduncled, often interrupted, racemes, 6–20 cm. long, exceeding the leaves, each whorl subtended by an ovate to lanceolate, sericeous, usually several-nerved, often trifid or incised bract 7–9 mm. long, 2.5–3.5 mm. wide; *bractlets* linear, 3.5–5 mm. long, sericeous; *pedicels* 1–2 (in fruit up to 3) mm. long, velutinous; *calyx* densely sericeous-strigose, 5–8 mm. long, the narrowly lance-attenuate teeth about twice the length of the tube, the


FIGURE 8.—Glycine javanica L.
(*Bourne 1087*–Kew) Plant × ½. Flowers × 3½. Pod × 1. Seeds (small) × 1.

lowermost falcate and sometimes distinctly exceeding the straight lateral and uppermost teeth, a pair of setaceous, sericeous bracteoles, 3–3.5 mm. long, at the base of the calyx; *corolla* reddish violet to violet-blue, fading to blue, the standard rhomboid-suborbicular, 8–11 mm. long (the blade nearly 3 times the length of the claw), auriculate, 2–3 mm. longer than the narrowly oblong, obtuse wings, the very blunt, auriculate keel conspicuously shorter than the wings; *pod* linear, 20–27 mm. long, 2–3 mm. wide, densely velutinous, the indument olive-gray, somewhat torulose, septate and compressed; *seeds* 5–8, oblong-oval, 2×1.5 mm., pale brown, the hilum small, the narrow caruncle white, papyraceous, erect, 0.25–0.4 mm. wide.

Ethiopia (Addis Ababa and Province of Bogemedar) and Kenya (Mt. Kulal, alt. 7,000 ft.). Climbing among bushes, on waste ground and in open woods.

As mentioned by Richard,[22] this is one of the most ornamental species in the genus, the flowers being unusually large and colorful and the whole plant covered with a silky-velvety pubescence.

The plate accompanying Richard's original description of this species shows the terminal leaflet as being sessile like the lateral pair, and E. G. Baker (p. 357) [23] distinguishes it from *Glycine javanica* on the basis of having the terminal leaflet more or less sessile (in addition to brown-tomentose pods). Actually, the leaves are pinnately foliolate, the stalk of the terminal leaflet, including petiolule and leaf-rachis, being at least twice as long as those of the lateral leaflets, often 5 to 6 times as long.

### 8. **Glycine javanica** L. (Fig. 8)

*Glycine javanica* L., Sp. Pl. 754. 1753.
*Soja javanica* (L.) R. Grah. *in* Wall., Cat. n. 5528. 1828.
*Soja wightii* R. Grah. *in* Wall., Cat. n. 5530. 1828.
*Notonia wightii* Wight & Arn., Prodr. 208. 1834.
*Johnia wightii* Wight & Arn., Prodr. 449. 1834.
*Glycine bujacia* Benth., Ann. Wien Mus. 2 : 126. 1838.
*Shuteria vestita* Benth., Linn. Soc. Jour. 8 : 267. 1865, not Wight & Arn. 1834.

Climbing, usually twining, vine from a thick, woody rootstock; *stems* terete or subterete, sometimes woody at the base, 2–2.5 (occasionally 3 toward the base) mm. in diameter, 2–5 m. long, more or less hirsute, with usually reflexed, sometimes appressed, tawny or ferrugineous hairs; *leaves* pinnately trifoliolate, their petioles 2–12 cm. long, more or less sulcate and reflexed-hirsute, the rachis 2–20 mm.

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[22] RICHARD, ACHILLE. TENTAMEN FLORAE ABYSSINICAE. 472 pp. Paris. 1847–51.
[23] See footnote 17, p. 5.

long, hirsute to glabrate, the stipules ovate, 1.2–5 mm. long, strongly several-nerved, strigose; *leaflets* thin, oval to ovate (the lateral often inequilateral), 3–10 cm. long, 1.5–7 cm. wide, acute or acuminate or rarely broadly obtuse and mucronate at the apex, abruptly tapering

FIGURE 9.—Glycine javanica subsp. micrantha (Hochst. *ex* A. Rich.) F.J.Herm. (*Mission de Witte 1077*–Jard. Bot. Bruxelles; pods and seeds, *P. O. Weihe 226*–Kew) Plant × ½. Flowers × 3½. Pods × 1.

to rounded or almost truncate at the base, more or less strigose to glabrate above (the margins and veins sometimes densely strigose), generally pilose to silky-strigose and prominently veined beneath, the secondary veins 4–7 pairs, usually hirtellous or strigose, the stipels setaceous, 1–3.5 mm. long; *bracts* persistent, ovate, 3–4 mm. long, strigose to glabrate; *racemes* axillary, from short, very compact, stout, oblong-ovoid, often almost headlike, densely (70–150)-flowered and tapering to an acute apex during the early stages of anthesis to somewhat interrupted as the rachis elongates, 2–18 cm. long, on peduncles 2–10 cm. long; *fascicle-bracts* narrowly linear-lanceolate to setaceous, 3.5–5.5 mm. long, appressed-pilose; *bractlets* setaceous, 2.5–3.5 mm. long, hirtellous; *flowers* conspicuously exceeded, before maturity, by the unusually long fascicle-bracts and setaceous calyx-teeth, on short glabrous to minutely sericeous pedicels, 0.5–1 mm. long, somewhat nodose at the base, in generally approximate fascicles of 2–7; *calyx* 3.75–5.5 mm. long, sparsely strigillose to hirsute, the subequal, setaceous or lanceolate-setaceous teeth about three times the length of the tube; *corolla* white (the wings sometimes purple-tinged), becoming reddish with age, usually approximating the calyx in length but sometimes even shorter, the standard suborbicular, 4–6 mm. long (the claw one-third the length of the blade), auriculate, the wings oblong, 3–5 mm. long, auriculate, with blade and claw subequal, the claw of the subequal keel nearly equaling the oval, truncate-based blade; *pod* oblong-linear, 2–3 cm. long, 4–5 mm. wide, transversely septate and more or less constricted between the seeds, margined, more or less densely hirsute or strigose, the generally reddish-brown hairs either spreading or appressed; *seeds* 3–5, short-oblong to subquadrangular, biconvex with flattened sides, 2.25–3.5×1.5–2.5 mm., reddish-brown, minutely granular, the caruncle liguliform, scarious, white, generally recurved.

India and Ceylon; Malaya; Java.

It is unfortunate that the *Glycine javanica* known to Linnaeus came from India rather than from Africa, where the species is much more complex, more widespread, and more plentiful. Because of this the extensive African population, with its many variants, must be burdened with trinomials and quadrinomials.

8a. **Glycine javanica** subsp. **micrantha** (Hochst. *ex* A.Rich.) F.J.Herm. (Fig. 9)

*Glycine javanica* subsp. *micrantha* (Hochst. *ex* A. Rich.) F.J.Herm., comb. nov.

*G. micrantha* Hochst. *in* Schimp., Hb. Abyss. n. 8, *ex* A. Rich., Tent. Fl. Abyss. 1:212. 1847.

Differing from the typical subspecies in having the stems often much branched; *racemes* more or less interrupted, many (20–100) but rather

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loosely flowered, 3–25 cm. long, on peduncles 2–6 cm. long; *fascicle-bracts* and bractlets similar (the former slightly longer), setaceous, 1.25–2.5(4) mm. long, hirtellous; *flowers* on more or less hirtellous pedicels, in usually scattered fascicles of 2–5; *calyx* 3–5 mm. long, hirsute, the teeth lanceolate-setaceous, about twice the length of the tube; *corolla* white or yellowish, sometimes violet-tinged, becoming reddish-orange with age, from scarcely exceeding to twice the length of the calyx; *pod* linear, 3–5 mm. wide; *seeds* 3–7, greenish or occasionally straw-colored, to dark purplish-brown, sometimes mottled.

Throughout tropical Africa. Twining or scrambling over shrubs or small trees, sometimes completely covering them, on edges of woods or in thickets, on roadsides, and in grassy or fallow fields.

The most widespread and plentiful *Glycine*. It is extremely polymorphic, some variants being so different from others in general aspect that it is difficult upon first acquaintance to believe them conspecific, yet most of the distinctions are connected by an extensive series of intergradations. An exception to this instability is a form in which the pods are conspicuously and consistently retrorse-hirsute (the pubescence being normally antrorse), but this characteristic is not correlated with other distinctions, occurring indiscriminately in vars. *claessensii* and *mearnsii* as well as in the typical subspecies, so that taxonomic designation is not feasible.

Although the following infraspecific taxa by no means cover all of the forms, nor in some cases even the most pronounced variants, yet they are the most frequent and relatively stable forms so that their nomenclatorial recognition is of practical value.

8b. **Glycine javanica** subsp. **micrantha** var. **claessensii** (De Wild.) Hauman

*Glycine javanica* var. *claessensii* (De Wild.) Hauman, Fl. Congo Belge, Spermat. 6:96. 1954.

*G. claessensii* De Wild., Rev. Zool. Africaine 12:B7. 1924.

*G. albidiflora* De Wild., Rev. Zool. Africaine 12:B5. 1924.

A rather poorly marked variety, sometimes quite intangible. It differs from the typical subspecies in a tendency of the pubescence of the stems, petioles, peduncles, bracts, and calyx to be more dense and less

appressed, of the upper surface of the leaflets to be sparsely velutinous and the lower surface rather copiously so, and of the leaflet-apex to be more or less obtuse or only slightly acuminate.

Uganda to Nyasaland. In the Congo it appears to be restricted to the eastern portion of the country where it is said to be very abundant.

8c. **Glycine javanica** subsp. **micrantha** var. **mearnsii** (De Wild.) Hauman

*Glycine javanica* var. *mearnsii* (De Wild.) Hauman, Fl. Congo Belge, Spermat. 6:96. 1954.

*G. mearnsii* De Wild., Rev. Zool. Africaine 12:B15. 1924.

A robust variety, the petioles being long and stout and the leaflets often 10 cm. long or more, and the racemes, in which the fascicles are many-flowered, attaining 40 cm. in length. The flowers are somewhat larger, often 7 mm. long, and the standard is rhomboid rather than suborbicular.

Belgian Congo; Uganda; and southern Ethiopia.

8d. **Glycine javanica** subsp. **micrantha** var. **paniculata** Hauman

*Glycine javanica* var. *paniculata* Hauman, Fl. Congo Belge, Spermat. 6:97. 1954; Jard. Bot. de l'Etat Brux. Bul. 25:94. 1955.

Stems extensively branched; inflorescence terminal, in ample panicles up to 60 cm. long, with few, more or less fastigiate, loosely flowered branches, 25–30 cm. long. The lower calyx-lobe has been described as exceeding the corolla, but this is so only in the bud and immature flower.

Belgian Congo. Said to be very common in gallery forests.

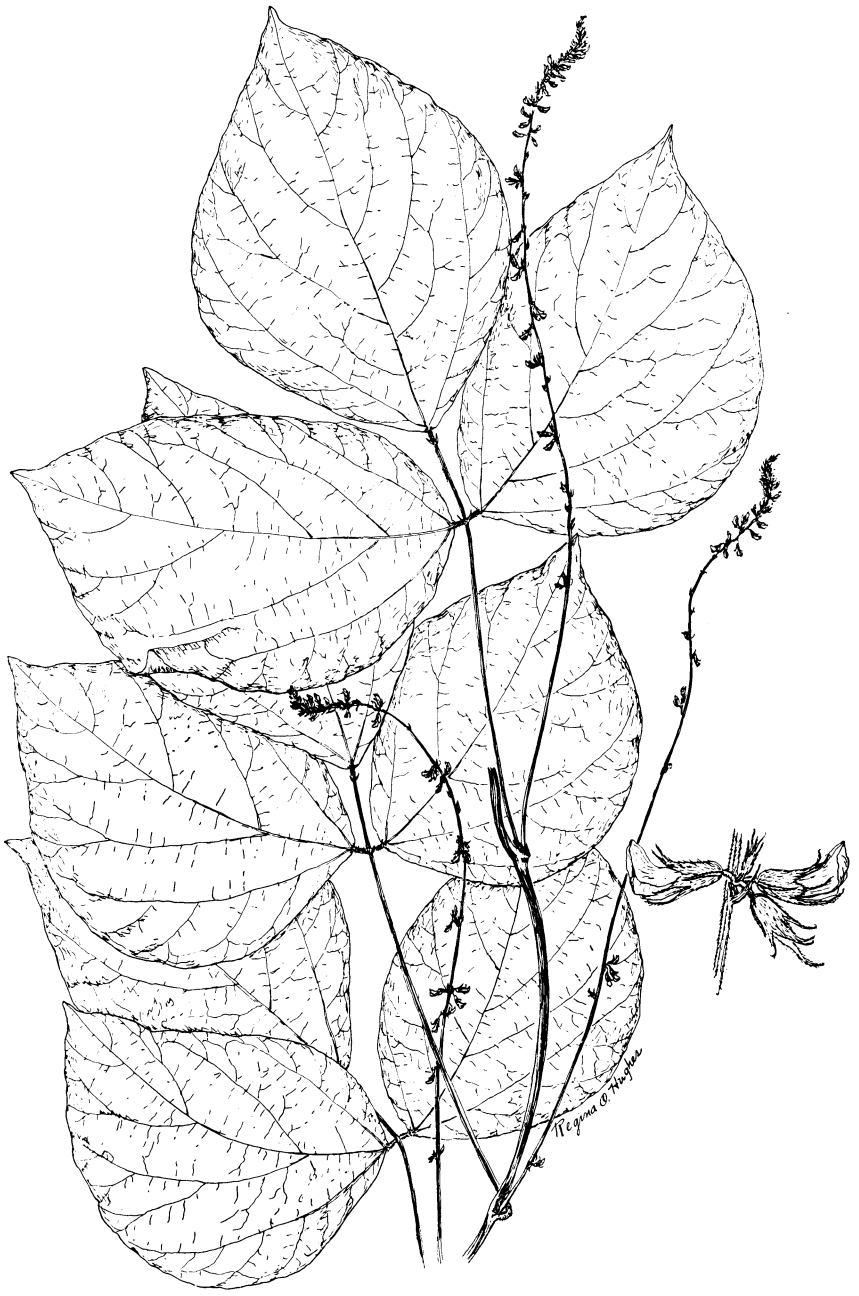

FIGURE 10.—Glycine javanica subsp. micrantha var. longicauda (Schweinf.) Baker.
(*Schweinfurth 1088* (Type)–Naturhist. Mus. Vienna) Plant × ½. Flowers × 2½.

8e. **Glycine javanica** subsp. **micrantha** var. **longicauda** (Schweinf.) Baker. (Fig. 10)

*Glycine javanica* var. *longicauda* (Schweinf.) Baker *in* Oliver, Fl. Trop. Afr. 2:178. 1871.

*G. longicauda* Schweinf., Zool.-Bot. Gesell. Wien Verhandl. 18:658. 1868.

A well-marked variety distinguished by its very large (12–15 cm. long), thin leaflets and its elongated (25–35 cm.), slender, lax racemes with more widely separated fascicles of smaller (4–5 mm.) flowers. The whole plant is glabrescent.

Ethiopia, Tanganyika, and Angola.

8f. **Glycine javanica** subsp. **micrantha** var. **moniliformis** (Hochst. *ex* A.Rich) F.J.Herm.

*Glycine javanica* subsp. *micrantha* var. *moniliformis* (Hochst. *ex* A.Rich.) F.J.Herm., comb.nov.

*G. moniliformis* Hochst. *in* Schimp., Hb. Abyss. n. 703 *ex* A. Rich., Tent. Fl. Abyss. 1:211. 1847.

A generally distinctive variety in its cinereous-strigose vesture, which gives the whole plant an ashy-gray aspect; its very small flowers, the corolla seldom over 4 mm. long and little exceeding the calyx; its very slender, usually widely interrupted racemes 25–40 cm. long; and in its narrow pods (3 mm. wide), which are more conspicuously constricted between the seeds than in the other varieties. But intermediate forms are not infrequent, particularly in Eritrea.

Ethiopia and Eritrea.

8g. **Glycine javanica** subsp. **pseudojavanica** (Taub.) Hauman

*Glycine javanica* subsp. *pseudojavanica* Hauman, Fl. Congo Belge, Spermat. 6:97. 1954.

*G. pseudojavanica* Taub. *in* Engl., Pflanzenw. Ost.-Afr. C:200. 1895.

*G. rooseveltii* De Wild., Rev. Zool. Africaine 12:B18. 1924.

Generally a robust, hirsute, or villous vine with pedicels from 0.75–2.5 mm. long, bracteoles only 1.5 mm. long, flowers 4.5–6 mm. long, the standard suborbicular and ovaries and pods glabrous or occasionally with a trace of pubescence.

Belgian Congo, Uganda, Kenya, Tanganyika, and Angola. Savannas, fallow fields, and marshes up to an altitude of 2,000 m.

8h. **Glycine javanica** subsp. **pseudojavanica** var. **laurentii** (De Wild.) Hauman

*Glycine javanica* var. *laurentii* (De Wild.) Hauman, Fl. Congo Belge, Spermat. 6:97. 1954.

*G. laurentii* De Wild., Rev. Zool. Africaine 12:B13. 1924.

*G. moniliformis* auct., non Hochst.; Bak.f., Leg. Trop. Afr. 359. 1929, *pro parte.*

A large vine with the glabrous ovaries and pods of subspecies *pseudojavanica* but the vegetative parts glabrescent and with thin, glossy leaflets usually only sparsely strigose above, glabrous beneath except for the sparsely strigose nerves, pedicels 1–1.5 mm. long, flowers 3.5–4.5 mm. long and standard cuneiform to subauriculate above the claw.

Belgian Congo. Second-growth woods, gallery forests, savannas, fallow and cultivated fields.

## 3. Subgenus **Soja** (Moench) F.J.Herm.

*Soja* Moench (as section), Meth. 153. 1794; Taub. *in* Engl. & Prantl., Die Natürl. Pflanzenf. 3(3):360. 1894.

*Phaseolus* L. (as genus), Sp. Pl. 725. 1753, *pro parte.*

*Dolichos* L. (as genus), Sp. Pl. 727. 1753, *pro parte.*

*Soja* Savi (as genus), Mem. Phas. 2:16. 1822.

Of the two species in this subgenus, *Glycine ussuriensis* is Asiatic, and the most northern in its distribution of any in the genus, and *G. max*, known only in cultivation, is a derivative of either *G. ussuriensis* or some Asiatic ancestor closely related to it. They differ from the species of the subgenus *Glycine* in having the flowers in axillary clusters or greatly reduced racemes without a bract at the base of the fascicles, and in having the broad, often curved, 2- to 4-seeded pods not constricted between the seeds. From the species of the subgenus *Leptocyamus* they differ in having the flowers irregularly inserted (sometimes in pairs, sometimes singly) along the rachis of a greatly reduced raceme, instead of inserted singly, or fascicled in the leaf-axils, as well as in their short, broad, few-seeded pods. In addition, *G. max* is the only member of the genus having a normally erect, instead of twining or climbing, habit.

### Key to Subgenus *Soja*

1a. Twining, usually slender, vine; bracteoles 1–2 mm. long: flowers 4–6 mm. long; pods 14–24 mm. long, 3.75–5 mm. wide, dark brown at maturity; seeds of an oblong type, 3–5.25×2.25–3.5 mm., dark brown ..... 9. *G. ussuriensis*

1b. Bushy, usually coarse and erect, herb; bracteoles 2.5–3.25 mm. long; flowers 6–7 mm. long; pods 25–75 mm. long, 8–15 mm. wide, yellowish brown at maturity; seeds of a globose or ovoid type, 6–11×5–8 mm., white to reddish black ..... 10. *G. max*

FIGURE 11.—Glycine ussuriensis Regel & Maack. *in* Regel.
(*Cavalerie & Fortunat 2619;* flower detail, *Faurie 6206*–Mus. Hist. Nat. Paris)
Plant × ½. Leaf and pod detail × 1. Flowers × 2½. Seeds × 2½.

9. **Glycine ussuriensis** Regel & Maack. *in* Regel (Fig. 11)
*Glycine ussuriensis* Regel & Maack. *in* Regel, Tent. Fl. Ussur. 50. 1861.

*G. javanica* Thunb., Linn. Soc. Trans. 2:340. 1784, *pro parte*, not L. 1753.

*G. soja* Sieb. & Zucc. *in* Abh. Akad Muench. 4(2):119. 1843, not *Dolichos soja* L., Sp. Pl. 727. 1753.

*G. formosana* Hosokawa, Soc. Trop. Agr. Jour. [Taiwan] 4:308. 1932.

Twining vine; *stems* slender, subquadrangular to subterete, more or less retrorsely strigose or hirsute with usually tawny hairs; *leaves* pinnately trifoliolate, their petioles 1.5–9 cm. long, more or less sulcate and retrorse-strigose, the rachis 2–15 mm. long, the stipules lanceolate to ovate-lanceolate, strongly several-nerved, strigose; *leaflets* membranaceous, ovate to oblong-elliptic or narrowly lanceolate, 1.5–9 cm. long, 0.6–4 cm. wide, the terminal often somewhat longer than the lateral, the lateral sometimes inequilateral, acute (rarely obtuse) to abruptly acuminate, mucronate, tapering to rounded at the base, sparsely silky-strigose (especially on the margins and veins) on both surfaces or glabrate above, their petiolules about 1.5 mm. long, stipels subulate to setaceous, 1–1.75 mm. long; *bracts* deltoid-lanceolate about 1.75 mm. long; *racemes* axillary, very short, 6–21 mm. long, loosely 4–7(13)-flowered, on very slender, sparsely strigillose or puberulent to glabrate peduncles, 0.5–7 mm. long, or the flowers sometimes nonpedunculate inserted singly or in pairs in the axils; *bractlets* lanceolate 1–1.5 mm. long, strigose, caducous, sometimes obsolete; *flowers* small, on slender, strigose or hirsute pedicels 1–3 mm. long; *calyx* 3–4 mm. long, strigose or occasionally hirsute, the subequal lance-subulate teeth equaling or slightly exceeding the tube, the upper pair united for half their length or more, the bracteoles linear to setaceous, 1–2 mm. long; *corolla* pink, lilac or mauve to purple, the standard suborbicular-obovate, erect-ascending, (3) 4–6 mm. long, exceeding the oblong wings which are about 1.5 mm. longer than the short, blunt keel; *pod* linear-oblong, subfalcate, 14–24 mm. long, 3.75–5 (5.5) mm. wide, more or less strigose or hirsute to setose (the stiff hairs often 1.5 mm. long), dark brown at maturity; *seeds* 2–4, oval-oblong to short-oblong, more or less flattened biconvex to subcylindrical, 3–5.25×2.25–3.5 mm., dark reddish brown to dark brownish purple, sometimes mottled, smooth, or minutely foveolate, the caruncle scalelike, chartaceous, mostly erect, ⅓ to ½ the width of the hilum.

Northern and Central China, Formosa, Japan, Korea, Manchuria, and adjacent Siberia.

In fields, thickets, and hedgerows, and along roadsides, and riverbanks.

Examination of the type collection of *Glycine formosana* Hosokawa showed it to be merely a form of *G. ussuriensis* with abnormally narrow leaflets. It is a phase not confined to Formosa but of occasional occurrence throughout the range of *G. ussuriensis*.

FIGURE 12.—Glycine max (L.) Merr.
(*U.S. Natl. Herb. 402248*)–Plant × ½. Inflorescence × ½. Flower × 3. Pod × ½.

10. **Glycine max** (L.) Merr. Soybean. (Fig. 12)

*Glycine max* (L.) Merr., Interpr. Rumph. Herb. Amboin. 274. 1917.

*Phaseolus max* L., Sp. Pl. 725. 1753.

*Dolichos soja* L., Sp. Pl. 727. 1753.

*Soja hispida* Moench, Meth. 153. 1794.

*S. japonica* Savi *in* Nuov. Giorn. Lett. 8: 113. 1824.

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*S. viridis* Savi, Cose Bot. 9. 1832.
*S. angustifolia* Miq., Fl. Ind. Bat. 1: 223. 1855.
*Glycine hispida* (Moench) Maxim. *in* Acad. Pétersb. Bul. 18: 398. 1873.
*Soja max* (L.) Piper, Amer. Soc. Agron. Jour. 6: 84. 1914.
*Glycine gracilis* Skvortz., Pub. Manchur. Res. Soc., Nat. Hist. Sect., Ser. A., Fasc. 22: 8. 1927; Lingnan Sci. Jour. 6: 213. 1928.

Bushy, generally rather coarse, herb; *stems* usually stout (up to 4 mm. in diameter), terete toward the base, more or less angled and sulcate to subquadrangular above, 0.3–2 mm. high, brownish or tawny hirsute to pilose with pale hairs, some of the shoots occasionally vinelike; *leaves* pinnately trifoliolate, their petioles 2–20 cm. long, from subterete and sparsely pilose or glabrescent to strongly angled, sulcate and hirsute, the rachis 0.5–3 cm. long, the stipules broadly ovate, abruptly acuminate, 3–7 mm. long, conspicuously several-nerved, more or less strigose; *leaflets* membranaceous, broadly ovate, suborbicular, oval or elliptic-lanceolate, 3–14 cm. long, 2.5–10 cm. wide, the terminal seldom appreciably larger than the lateral, the lateral usually more or less inequilateral, generally acute but frequently obtuse and mucronulate, occasionally deltoid-acuminate, tapering to rounded or subtruncate at the base, usually sparsely silky-strigose on both surfaces or glabrate above, occasionally rather densely strigose-velutinous below, their petiolules 1.5–4 mm. long usually densely hirsute, stipels narrowly lanceolate to setaceous, 1–3.5 mm. long; *bracts* from broadly to narrowly lanceolate 4.5–5.5 mm. long, several-nerved, strigose; *racemes* axillary, irregular, often leafy, very short, 10–35 mm. long, usually rather compactly few (5–8)-flowered, the peduncle and pedicels often reduced and concealed by a densely hirsute vesture, the flowers sometimes single or paired in the lower axils; *bractlets* from broadly to narrowly lanceolate, 2–3 mm. long, more or less strigose, caducous; *flowers* on usually densely hirsute (occasionally glabrescent) pedicels 0.25–3 mm. long; *calyx* (4) 5–7 mm. long, setose to appressed-hirsute or strigose, the teeth subequal, lanceolate to lanceolate-attenuate, the upper pair generally united to above the middle, the bracteoles setaceous, appressed, setose (2) 2.5–3.25 mm. long; *corolla* white, pink, greenish blue, violet or purple, (4.5) 6–7 mm. long, the standard suborbicular-obovate to subreniform, emarginate, somewhat longer than the narrowly oblong wings which much exceed the keel, porrect or somewhat upturned near the apex; *pod* oblong, subfalcate, pendent, 25–75 mm. long, 8–15 mm. wide, coarsely hirsute or setose (the bristly hairs up to 2.5 mm. long), yellowish brown; *seeds* 2–3, ovoid to subspherical or irregularly rhomboidal, 6–11×5–8 mm., greenish cream or grayish

olive to reddish black, smooth, the caruncle scalelike, membranaceous, erect or appressed, about ⅓ to ½ the width of the hilum.

Widely cultivated; not known in the wild state. It is believed to be a cultigen derived from *Glycine ussuriensis*.

Extremely variable. Thirty-six trivial variants described and named as subspecies and varieties by Skvortzow[24] do not seem to merit nomenclatorial designation.

Horticultural varieties were discussed by Piper and Morse[25] in 1910 and more recently by Nagata.[26]

## Species Excluded From Glycine

*Glycine abrus* L., Sp. Pl. 753. 1753 = Abrus precatorius L.

*G. abyssinica* Juss. *ex* DC., Prod. 2: 386. 1825 = Rhynchosia pubescens DC.

*G. abyssinica* Hochst. *ex* A. Rich., Tent. Fl. Abyss. 1: 212. 1847 = Teramnus labialis (L.f.) Spreng.

*G. ambigua* Jacq., Fragm. 84, t.135. 1809. Not definitely identifiable but Jacquin's plate shows the flowers with a striate corolla 3 to 4 times the length of the calyx, which excludes *Glycine*.

*G. americana* Tenore *ex* Steud., Nomencl. (ed. 2) 1: 691. 1840. *Nomen nudum*.

*G. americana* Sessé & Moc., Pl. N. Hispan. (ed. 1) 124. 1887. Characterized in the original description as having pendent racemes and terete pods which would eliminate *Glycine*.

*G. andongensis* Welw. *ex* Bak. *in* Oliver, Fl. Trop. Afr. 2: 179. 1871 = Teramnus andongensis (Welw. *ex* Bak.) Bak.f.

*G. angulata* Desv., Jour. Bot. [London] 1: 78. 1814 = Teramnus uncinatus (L.) Sw.

*G. angulosa* Muhl. *ex* Willd., Sp. Pl. (ed. 3) 1056. 1802 = Strophostyles helvola (L.) Ell.

*G. angustifolia* Jacq., Hort. Schoenb. 2: 55. 1797 = Rhynchosia uniflora Harv.

*G. anonychia* Walp., Linnaea 13: 532. 1839 = Teramnus labialis (L.f.) Spreng.

*G. apios* L., Sp. Pl. 753. 1753 = Apios americana Medic.

*G. arborea* Fisch., Hort. Gorenk. (ed. 2) 70. 1812. *Nomen nudum*.

*G. argentea* Thunb., Prod. Pl. Cap. 131. 1800 = Rhynchosia argentea (Thunb.) Harv.

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[24] SKVORTZOW, B. W. NEW PLANTS FROM NORTH MANCHURIA, CHINA. Lingnan Sci. Jour. 6(3): 213–216. 1928.

[25] PIPER, C. V., and MORSE, W. J. THE SOY BEAN; HISTORY, VARIETY, AND FIELD STUDIES. U.S. Bur. Plant Indus. Bul. 197, 78 pp., illus. 1910.

[26] NAGATA, T. STUDIES ON THE DIFFERENTIATION OF SOYBEANS IN JAPAN AND THE WORLD. Hyogo Univ. Agr. Mem. 3(2), Agron. Ser. 4: 63–102. 1960.

*G. atomaria* Willd. *ex* Spreng., Systema 3: 196. 1826. Type not seen, and original description too brief for identification but the phrase "leaflets black-punctuate" eliminates *Glycine.*

*G. atrorubra* Regel, Cat. Pl. Hort. Aksakov. 65. 1860. *Nomen nudum.*

*G. aurea* Willd., Ges. Naturf. Fr. Neue Schr. 4: 218. 1803 = Rhynchosia aurea (Willd.) DC.

*G. axilliflora* Kotschy, Acad. der Wiss. Wien, Math.-Nat. Kl. Sitzber 51, Abt. 2: 366. 1865 = Teramnus axilliflorus (Kotschy) Bak.f.

*G. backhousiana* Regel, Cpt. Pl. Hort. Aksakov. 65. 1860. *Nomen nudum.*

*G. bequaertii* De Wild. *in* Fedde, Repert. 11: 547. 1913 = Pseudoeriosema bequaertii (De Wild.) Hauman

*G. biflora* Schum. & Thonn., Beskr. Guin. Pl. 345. 1827 = Dolichos biflorus L.

*G. biloba* Lindl., Bot. Reg. 17, t. 1418. 1831 = Phaseolus sp.

*G. bimaculata* Curt., Bot. Mag., t. 263. 1794 = Hardenbergia monophylla Benth.

*G. bimaculata* Moench, Meth. Suppl. 46. 1802. Described as a shrub with simple leaves which would exclude *Glycine.*

*G. bituminosa* L., Sp. Pl. 754. 1753 = Fagelia bituminosa (L.) DC.

*G. borianii* (Schweinf.) Baker *in* Oliver, Fl. Trop. Afr. 2: 180. 1871 = Pseudoeriosema borianii (Schweinf.) Hauman

*G. botrydium* Walp., Rep. 1: 760. 1842 = Teramnus uncinatus (L.) Sw.

*G. brachybotria* Hort. *ex* Pasq., Cat. Orto Bot. Nap. 49. 1867. *Nomen nudum.*

*G. bracteata* L., Sp. Pl. 754. 1753 = Amphicarpa bracteata (L.) Fern.

*G. buettneri* Harms *in* Engl, Jahrb. 26: 302. 1899 = Teramnus buettneri (Harms) Bak.f.

*G. caerulea* Salisb., Prod. 335. 1796 = Wisteria speciosa Nutt.

*G. cajanoides* Walp., Nov. Act. Nat. Cur. 19, Sup. 1: 324. 1843 = Desmodium quinquepetalum (Blanco) Merr.

*G. cana* Willd., Sp. Pl. (ed. 3) 1063. 1802 = Rhynchosia cana (Willd.) DC.

*G. capitata* Heyne *in* Roth, Nov. Pl. Sp. 346. 1821 = Rhynchosia aurea (Willd.) DC.

*G. caribaea* Jacq., Ic. Pl. Rar., t. 146, Coll. 1: 67. 1786 = Rhynchosia caribaea (Jacq.) DC.

*G. caroliniana* Spreng., Systema 3: 197. 1826 = Rhynchosia tomentosa (L.) Hook. & Arn.

*G. chinensis* Sims, Bot. Mag. t. 2083. 1819 = Wisteria sinensis (Sims) Sweet

*G. coccinea* Curt., Bot. Mag. t. 270. 1794 = Kennedya prostrata R.Br.

*G. comosa* L., Sp. Pl. 754. 1753 = Amphicarpa bracteata (L.) Fern.

*G. comptoniana* Andr., Bot. Rep. t. 602. 1810 = Kennedya comptoniana (Andr.) Link

*G. corallina* Salisb., Prod. 334. 1796 = Rhynchosia phaseoloides (Sw.) DC.

*G. cordifolia* Harms *in* Engl., Jahrb. 49:441. 1913 = Desmodium cordifolium (Harms) Schindl.

*G. crinita* H. B. K., Nov. Gen. & Sp. 6:421. 1823 = Eriosema crinitum (H. B. K.) G.Don

*G. cyanea* De Wild., Rev. Zool. Africaine 12, Suppl. Bot. 8. 1924 = Teramnus micans var. cyaneus (De Wild.) Hauman

*G. cylindriflora* Wall., Cat. n. 5516. 1828 = Shuteria ferruginea Bak.

*G. dalbergioides* Zipp. *ex* Span., Linnaea 25:190. 1841. *Nomen nudum.*

*G. debilis* Ait., Hort. Kew (ed. 1) 3:54. 1789 = Teramnus labialis (L.f.) Spreng.

*G. densiflora* Roth, Nov. Pl. Sp. 348. 1821 = Rhynchosia densiflora (Roth) DC.

*G. ?dentata* Vahl *ex* Schum. & Thonn., Beskr. Guin. Pl. 2:122. 1827 = Dolichos argenteus Willd.

*G. diffusa* H. B. K., Nov. Gen. & Sp. 6:420. t. 572. 1823 = Eriosema diffusum (H. B. K.) G.Don.

*G. digitata* Harms *in* Engl., Jahrb. 28:408. 1900 = Paraglycine digitata (Harms) F.J.Herm.

*G. discolor* Willd. *ex* Spreng., Systema 3:196. 1826. The very brief description is inadequate for identification but the combination of verticillate peduncles on a vine and falcate, 2-seeded pods does not apply to any known species of *Glycine.*

*G. discolor* Mart. & Gal., *in* Brux. Acad. Bul. 10(2):190. 1843 = Teramnus uncinatus (L.) Sw.

*G. dolichoides* Desv., Ann. des Sci. Nat., Bot. (ser. 1) 9:415. 1826 = Teramnus labialis (L.f.) Spreng.

*G. dubia* Colla, Hort. Ripul. App. 3:37. 1825 = Galactia sp.

*G. elegans* Hochst., Flora 24, I. Intell. 42. 1841 = Rhynchosia elegans (Hochst.) A. Rich.

*G. elliptica* Mart. & Gal., *in* Brux. Acad. Bul. 10(2):190. 1843 = Teramnus uncinatus (L). Sw.

*G. elliptica* Sm. *in* Abbot & Sm., Nat. Hist. Lepidopt. Insects Georgia, t. 21. 1797 = Amphicarpa bracteata (L.) Fern.

*G. elongata* Roth, Nov. Pl. Sp. 347. 1821 = Rhynchosia aurea (Willd.) DC.

*G. emarginata* Desv., Jour. Bot. 1:78. 1814 = Galactia tenuiflora var. villosa Benth.

*G. ensiformis* Sessé & Moc., Pl. Novae Hispaniae (ed. 1) 124. 1889. Description inadequate for identification but the plant's scimitar-shaped pods and drooping racemes with very large flowers, as well as country of origin (Mexico), would exclude *Glycine.*

*G. erecta* Thunb., Prod. Pl. Cap. 131. 1800 = Rhynchosia chrysoscias Benth.

*G. erecta* Nutt., Gen. Amer. 2:114. 1818 = Rhynchosia tomentosa (L.) H. & A.

*G. ferruginea* R.Grah. *in* Wall., Cat. n. 5514. 1828 = Shuteria ferruginea (R.Grah.) Bak.

*G. filiformis* Desv., Ann. des Sci. Nat., Bot. (Ser. I) 9:415. 1826. The type of this species could not be located at Paris. The description is inadequate for identification.

*G. filiformis* Wall., Cat. n. 5510. 1828 = Teramnus labialis (L.f.) Spreng.

*G. filosa* Hornem., Hort. Hafniensis 2:682. 1815 = Amphicarpa bracteata (L.) Fern.

*G. flaccida* Wall., Cat. n. 5517. 1828 = Argyrolobium flaccidum Jaub. & Spach

*G. flexilis* R.Grah. *in* Wall., Cat. n. 5521. 1828 = Termnus flexilis (R.Grah.) Benth.

*G. floribundus* Willd., Sp. Pl. (ed. 3) 1066. 1802 = Wisteria floribunda (Willd.) DC.

*G. fortunei* (Maxim.) J.B. Norton, Biol. Soc. Wash. Proc. 38:88. 1925 = Apios fortunei Maxim.

*G. fridericiana* Weinm., Flora 4:29. 1821 = Rhynchosia fridericiana (Weinm.) DC.

*G. frutescens* L., Sp. Pl. 753. 1753 = Wisteria frutescens (L.) Poir.

*G. galactia* L., Syst. (ed. 10) 1173. 1759 = Galactia pendula Pers.

*G. galactioides* H.B.K., Nov. Gen. & Sp. 6:427. 1823 = Calopogonium galactioides (H.B.K.) Benth.

*G. gampsonychia* Walp., Linnaea 13:533. 1839 = Teramnus labialis (L.f.) Spreng.

*G. gilletii* DeWild., Mus. du Congo Belge, Ann. Bot. (ser. 5) 5(1): 150. 1904 = Teramnus andongensis (Welw. *ex* Bak.) Bak.f.

*G. glabra* Spreng., Neue Entdeck. 3:54. 1822 = Rhynchosia glandulosa (Thunb.) DC.

*G. glabrata* Steud., Nomencl. (ed. 2) 1:691. 1841 = Shuteria vestita (R.Grah.) W. & A.

*G. glandulosa* Thunb., Prod. Pl. Cap. 131. 1800 = Rhynchosia glandulosa (Thunb.) DC.

*G. glutinosa* Hoffmgg., Preisverz. 78. 1841; cf. Linnaea 16, Litt. 268. 1842. *Nomen nudum.*

*G. grahamii* Wall., Cat. n. 5513. 1828 (*nomen*); Benth. *in* Miq., Pl. Jungh. 233. 1852 = Grona grahamii (Wall. *ex* Benth.) Benth.

*G. guineensis* G.Don, Gen. Syst. 2:221. 1832 = Teramnus labialis (L.f.) Spreng.

*G. hainanensis* Merr. & Metcalf, Lingnan Sci. Jour. 16:194. 1937 = Teyleria koordersii (Backer) Backer

*G. hedysaroides* Willd., Sp. Pl. (ed. 3) 1060. 1802 = Paraglycine hedysaroides (Willd.) F. J. Herm.

*G. helvola* (L.) Ell., Jour. Acad. Sci. Philadelphia 1:326. 1818 = Strophostyles helvola (L.) Ell.

*G. heterocarpa* Hegetschw., Comm. Bot. 9, t. 5. 1813 = Amphicarpa bracteata (L.) Fern.

*G. heterophylla* Thunb., Prod. Pl. Cap. 131. 1800 = Rhynchosia glandulosa (Thunb.) DC.

*G. holophylla* (Bak.f.) Taub. *in* Engl., Jahrb. 23: 194. 1896 = Pseudoeriosema andongense (Welw. *ex* Bak.) Hauman

*G. holmbei* DeWild. in Fedde, Repert. 13:115. 1914 = Pseudoeriosema holmbei (DeWild.) Hauman

*G. humifusa* Willd., Enum. Hort. Berol. 756. 1809 = Rothia trifoliata (Roth) Pers.

*G. involucrata* Wall., Pl. As. Rar. 3:22. 1832 = Shuteria vestita (R.Grah.) W. & A.

*G. ixosperma* Hoffmgg., Verz. Pfl. Nachtrage 2:123. 1826. The very brief original description ascribes viscous seeds to the species. This, as well as its Brazilian origin, eliminates *Glycine.*

*G. jamaicenis* Guss. *ex* Colla, Hort. Ripul. App. 3:37. 1825. *Nomen nudum.* A species of *Centrosema.*

*G. javanica* Auct., non L. = Teramnus micans (Welw.) Bak.f.

*G. kisantuensis* DeWild., Mus. du Congo Belge, Ann. Bot. (ser. 5) 1:150. 1924 = Galactia tenuiflora var. villosa Benth. *in* Mart.

*G. koordersii* Backer, Schoolflora Voor Java 358. 1911. = Teyleria koordersii (Backer) Backer

*G. labialis* L.f., Suppl. 325. 1781 = Teramnus labialis (L.f.) Spreng.

*G. lagascana* DC., Prodr. 2:241. 1825 = Calopogonium galactioides (H.B.K.) Benth.

*G. lamarckii* H.B.K., Nov. Gen. & Sp. 6:424. 1823 = Rhynchosia minima (L.) DC.

*G. lamprocarpa* A. Cunn. *ex* Benth., Fl. Austral. 2:202. 1864 = Lamprolobium fruticosum Benth.

*G. lanceolifoliolata* De Wild., Rev. Zool. Africaine 12, Suppl. Bot. 12. 1924 = Teramnus andongensis (Welw. *ex* Bak.) Bak.f.

*G. lancifolia* Lagasca, Gen. & Spec. Nov. 24, 1816. Type destroyed and description insufficient for identification. Described from a cultivated plant thought to have come from the Canary Islands, which is very improbable if it was a true *Glycine*, and unless it was introduced there. The only specimen seen labeled *G. lancifolia* (with Gussone as author rather than Lagasca) is in the Colla Herbarium at the University of Turin. It is *G. clandestina* var. *sericea* Benth. and the data given are: "ex semin. Gussone 1862, fl. in H. Rip. 1879 Maj".

*G. lantzii Baill.* (as "lanztii"–sphalm), Linn. Soc. Paris Bul. 1: 382. 1883 = Pseudoglycine lyallii (Benth.) F.J.Herm.

*G. laotica* Gagnep. *in* Lecomte, Not. Syst. 3: 196. 1916 = Paraglycine laotica (Gagnep.) F.J.Herm.

*G. leptocarpa* R.Grah. *in* Wall., Cat. n. 5515. 1800 = Rothia trifoliata (Roth) Pers.

*G. leucosperma* Desv., Jour. Bot. Appl. 3: 78. 1814 = Galactia leucocarpa Desv.

*G. lignosa* Turpin *ex* Pers., Syn. 2: 301. 1819 = Galactia lignosa (Turp. *ex* Pers.) Urb.

*G. littoralis* Vahl *ex* DC., Prodr. 2: 385. 1825 = Rhynchosia minima (L.) DC.

*G. longipes* Harms *in* Engl., Jahrb. 33: 175. 1902 = Pseudoeriosema longipes (Harms) Hauman

*G. lucida* Forst.f., Prod. Fl. Ins. Austral. 51. 1786 = Strongylodon lucidus (Forst.f.) Seem.

*G. lucida* R.Grah. *in* Wall., Cat. n. 511. 1800 = Galactia tenuiflora (Willd.) W. & A.

*G. lucida* Blanco, Fl. Filip. (ed. 1) 578. 1837 = Dolichos lablab L.

*G. lyallii* Benth., Jour. Linn. Soc. 8: 266. 1865 = Pseudoglycine lyallii (Benth.) F.J.Herm.

*G. maclurei* Metcalf, Lingnan Sci. Jour. 19: 557. 1940 = Pueraria **maclurei** (Metcalf) F.J.Herm., comb. nov. The very long calyx-lobes, with erect-bristly pubescence and the long corolla (11–12 mm.) eliminate the species from *Glycine*. The papillose seed indicate that it is a *Pueraria*.

*G. macrophylla* H.B.K., Nov. Gen. & Sp. 6: 426. 1823 = Rhynchosia reticulata (Sw.) DC.

*G. macrophylla* Thonn. *in* Schum. & Thonn., Beskr. Guin. Pl. 348. 1827 = Rhynchosia mannii Bak.

*G. malacophylla* Spreng., Syst. 4, Cur. Post. 270. 1827 = Rhynchosia caribaea (Jacq.) DC.

*G. maranguensis* Taub. *in* Engl., Pflanzenw. Ost-Afr. C. 220. 1895 = Dolichos taubertii Bak.f.

*G. marmorata* R.Br. *ex* Benth., Fl. Austral. 2:263. 1864 = Cantharospermum marmoratum (Benth.) Taub.

*G. memnonia* Delile, Fl. d'Egypte 100, t. 38, f. 3. 1813 = Rhynchosia memnonia (Delile) DC.

*G. menispermoides* (DC.) Spreng., Systema 4, Cur. Post. 270. 1827 = Rhynchosia menispermoides DC.

*G. meyeri* Benth., Ann. Wien Mus. 2:126. 1838 = Teramnus labialis (L.f.) Spreng.

*G. micans* Welw. *ex* Bak. *in* Oliver, Fl. Trop. Afr. 2: 179. 1871 = Teramnus micans (Welw.) Bak.f.

*G. microptera* Zipp. *ex* Span., Linnaea 15: 195. 1841 = Rhynchosia minima (L.) DC.

*G. moerensis* De Wild., *in* Fedde, Repert. 12:294. 1913 = Pseudoeriosema moerensis (De Wild.) Hauman

*G. mollis* Willd., Sp. Pl. (ed. 3) 1062. 1802 = Rhynchosia mollis (Willd.) DC.

*G. mollis* Hook., Exot. Fl. 3, t. 201. 1827 = Rhynchosia caribaea (Jacq.) DC.

*G. mollis* Wight & Arn., Prodr. 208. 1834 = Teramnus labialis (L.f.) Spreng.

*G. mollissima* Ell., Sketch 2: 234. 1824 = Rhynchosia mollissima (Ell.) S. Wats.

*G. monantha* Zipp. *ex* Span., Linnaea 15:190. 1841. *Nomen nudum.*

*G. monniera* DC., Prodr. 2:242. 1825 = Rhynchosia sp.

*G. monoica* L., Sp. Pl. (ed. 2) 1023. 1763 = Amphicarpa bracteata (L.) Fern.

*G. monoica* Schkuhr *in* Usteri, Am. Bot. 12: 20, t. 2. 1794 = Amphicarpa bracteata (L.) Fern.

*G. monophylla* L., Mant. 1:101. 1767 = Hallia cordata Thunb.

*G. monophylla* Burm. f., Fl. Ind. 161. 1768 = Eleiotis sororia (L.) DC.

*G. monophylla* Nutt., Gen. Am. 2:115. 1818=Rhynchosia simplicifolia (Walt.) Wood

*G. monosperma* Willd. *ex* Spreng., Systema 3: 196. 1826 = Rhynchosia rufescens (Willd.) DC.

*G. moringaeflora* Delile *in* Caill., Voy. Meroe 4 (Cent. Pl. Meroe 327). 1827. Type not located but description refers to the corolla as 12.5 mm. long, too large for any known *Glycine.*

*G. multijuga* Clemen., Rev. Hort. 300. 1847 = Wisteria sinensis (Sims) Sweet

*G. nummularia* L., Mantissa 1: 571. 1767 = Rhynchosia nummularia (L.) DC.

*G. oblonga* Benth., Bot. Voy. Sulph. 84. 1844 = Teramnus volubilis (L.) Sw.

*G. oblongifolia* (E. Mey.) Harms *in* Engl., Pflanzenw. Afr. 3(1): 655. 1915 = Tephrosia oblongifolia E. Mey.

*G. oxyphylla* R.Grah. *in* Wall., Cat. n. 5522. 1828 = Galactia oxyphylla (R.Grah.) Benth.

*G. pallens* R.Grah. *in* Wall., Cat. n. 5518. 1828 = Teramnus labialis (L.f.) Spreng.

*G. parviflora* Zoll. *ex* Miq., Fl. Ind. Bat. 1:227. 1855 = Dumasia glaucescens Miq.

*G. parviflora* Lam., Encycl. 2: 378. 1876 = Teramnus labialis (L.f.) Spreng.

*G. pedunculariis* Muhl., Cat. 64. 1813 = Strophostyles helvola (L.) Ell.

*G. pedunculosa* Raf., Med. Repos. N. York 5: 360. 1808 = Strophostyles helvola (L.) Ell.

*G. pendula* Blume *ex* Miq., Fl. Ind. Bat. 1: 224. 1855 = Teramnus sp.

*G. pentandra* Spreng. *in* Schrad., Jour. 2: 197. 1800 = Teramnus labialis (L.f.) Spreng.

*G. pentandra* Spreng., Systema 3: 235. 1826 = Paraglycine hedysaroides (Willd.) F.J.Herm.

*G. pentaphylla* Dalz. *in* Hook., Kew Jour. 4: 344. 1852 = Paraglycine pentaphylla (Dalz.) F.J. Herm.

*G. phaseoloides* Sw., Prodr. 105. 1788 = Rhynchosia phaseoloides (Sw.) DC.

*G. picta* Vahl, Symb. Bot. 2: 81. 1791 = Eriosema violaceum (Aubl.) G.Don

*G. pinnata* Merr., Lingnan Sci. Jour. 14: 15. 1935 = Paraglycine pinnata (Merr.) F.J.Herm.

*G. pondicheriensis* Spreng., Systema 3: 196. 1826 = Rhynchosia rufescens (Willd.) DC.

*G. precatoria* Humb. & Bonpl. *ex* Willd., Enum. Hort Berol. 755 = Rhynchosia phaseoloides (Sw.) DC.

*G. priceana* (Robinson) Britt. *in* Britt. & Brown, Ill. Fl. (ed. 2) 2: 418. 1913 = Apios priceana Robinson

*G. procumbens* Willd. *ex* Steud., Nomencl. (ed. 2) 1: 691. 1840 = Rhynchosia diffusa (H. B. K.) DC.

*G. prostrata* Burm.f., "Fl. Cap. Prod. 21." 1768. Neither type nor description located. The page given in the Index Kewensis citation pertains to Cyperus and Scirpus only.

*G. pubescens* Balb. *ex* DC., Prodr. 2:386. 1825 = Rhynchosia pubescens (Balb.) DC.

*G. pubescens* Bert. *ex* DC., Prodr. 2:243. 1825 = Chaetocalyx pubescens (Bert.) DC.

*G. pugiunculus* Desv., Ann. des Sci. Nat., Bot. (ser. 1) 9:414. 1826 = Centrosema virginianum (L.) Benth.

*G. pulchella* H. B. K., Nov. Gen. & Sp. 6:422. 1823 = Eriosema pulchellum (H. B. K.) G.Don

*G. pulcherrima* Willd. *ex* Spreng., Systema 3:246. 1826 =Robinia aturensis Humb. *ex* Spreng.

*G. punctata* Willd., Sp. Pl. 3:1066. 1802 = Poiretia punctata (Willd.) Desv.

*G. radicosa* (A. Rich.) Bak.f., Legum. Trop. Afr. 358. 1929 = Paraglycine radicosa (A. Rich.) F.J.Herm.

*G. reducta* De Wild., Rev. Zool. Africaine 12, Suppl. Bot. 16. 1924 = Teramnus axilliflorus (Kotsch.) Hauman

*G. reflexa* Nutt., Gen. N. Amer. Pl. 2:115. 1818 = Rhynchosia minima (L.) DC.

*G. reniformis* Pursh, Fl. Amer. Sept. 2:86. 1816 = Rhynchosia tomentosa (L.) H. & A.

*G. repanda* Spreng., Mant. Fl. Hal. 47. 1807. Probably a *Rhynchosia*. Described as having punctate leaves so could not be a *Glycine*.

*G. repens* Taub. *in* Engl., Pflanzenw. Ost.-Afr. C:220. 1895 = Teramnus repens (Taub.) Bak.f.

*G. reticulata* Sw., Prod. Veg. Ind. Occ. 105. 1788 = Rhynchosia reticulata (Sw.) DC.

*G. reticulata* Vahl, Symb. 3:88. 1794 = Rhynchosia reticulata (Sw.) DC.

*G. retusa* Soland. *ex* Benth., Fl. Austral. 2:247. 1867 = Hardenbergia retusa (Soland.) Benth.

*G. rhombea* Schum. & Thonn., Beskr. Guin. Pl. 346. 1827 = Rhynchosia minima (L.) DC.

*G. rhombifolia* Herb. Madr. *ex* Wall., Cat. n. 5492. 1817 = Rhynchosia densiflora (Roth) DC.

*G. rhombifolia* Willd., Sp. Pl. 3:1065. 1802 = Rhynchosia minima (L.) DC.

*G. ringoetii* De Wild. *in* Fedde, Repert. 12:295. 1913 = Teramnus andongensis (Welw. *ex* Bak.) Bak.f.

*G. rosea* Forst.f., Prod. 50. 1786 = Canavalia obtusifolia (Lam.) DC.

*G. rubicunda* Schneev., Ic. Pl. Rar. t. 28. 1795 = Kennedya rubicunda (Schneev.) Vent.

*G. rufa* H. B. K., Nov. Gen. & Sp. 6:423. 1823 = Eriosema rufum (H.B.K.) G.Don

*G. rufa* Schum. & Thonn., Beskr. Guin. Pl. 344. 1827 = Eriosema glomeratum Hook.f.

*G. rufescens* Willd., Ges. Naturf. Fr. Neue Schr. 4:222. 1803 = Rhynchosia rufescens (Willd.) DC.

*G. sagittata* Humb. & Bonpl. *ex* Willd., Enum. Hort. Berol. 757. 1809 = Centrosema sagittatum (Humb. & Bonpl.) Brandeg. *ex* Riley

*G. sarmentosa* Roth, Catalecta, fasc. 2:87. 1800 = Amphicarpa bracteata (L.) Fern.

*G. scandens* Lam., Ill. t. 600. f. 2. 1797 = Poiretia scandens (Lam.) Vent.

*G. scarabaeoides* (L.) Roberty (as "*G. scarabaeoides* L."), Petite Flore de l'Ouest. Africain 325. 1934 = Cantharospermum scarabaeoideum (L.) Baill.

*G. schimperi* Hochst. & Steud. *ex* Steud., Nomencl. (ed. 2) 1:691. 1840 = Rhynchosia memnonia (Delile) DC.

*G. schliebenii* Harms, Notizbl. Bot. Gart. Berlin 11:814. 1933 = Paraglycine radicosa (A.Rich.) F.J.Herm.

*G. schliebenii* var. *enneaneura* Hauman, Brussels Jard. Bot. de l'Etat Bul. 25:95. 1955 = Paraglycine radicosa var. enneaneura (Hauman) F.J.Herm.

*G. schliebenii* var. *rufescens* Hauman, Brussels Jard. Bot. de l'Etat Bul. 25:95. 1955 = Paraglycine radicosa var. rufescens (Hauman) F.J.Herm.

*G. secunda* Thunb., Prod. Pl. Cap. 181. 1800 = Rhynchosia secunda (Thunb.) Eckl. & Zeyh.

*G. senegalensis* DC., Prodr. 2:242. 1825 = Teramnus labialis (L.) Spreng.

*G. sericea* Willd., Sp. Pl. (ed. 3) 1059. 1802. Original description inadequate for identification. The only specimens seen so named, one at Copenhagen and another at Turin, are not *Glycine*. De Candolle (Prodr. 2:242) describes it as having flowers of a *Clitoria*.

pink and with a reflexed keel, all of which characters would exclude *Glycine*.

*G. simplicifolia* H.B.K., Nov. Gen. & Sp. 6:419. 1823 = Eriosema simplicifolium (H.B.K.) G.Don

*G. sinensis* Sims, Bot. Mag., t. 2083. 1819; Lindl., Bot. Reg., t. 650. 1822 = Wisteria sinensis (Sims) Sweet

*G. speciosa* Soland., Prim. Fl. Ins. Pacif. 288. 1769 = Canavalia sericea A.Gray

*G. striata* Jacq., Hort. Vindob. 1:32. 1770 = Galactia striata (Jacq.) Urb.

*G. stricta* Hook., Comp. Bot. Mag. 1:22. 1835 = Galactia erecta (Walt) Vail

*G. suaveolens* L.f., Suppl. 326. 1781 = Rhynchosia suaveolens (L.f.) DC.

*G. sublobata* Schum. & Thonn., Beskr. Guin. Pl. 347. 1827 = Rhynchosia sublobata (Schum. & Thonn.) Meikle

*G. subonensis* Hayata, Ic. Pl. Formosa 9:27. 1920 = Teramnus sp.; probably T. angustifolius Merr.

*G. subterranea* L., Sp. Pl. (ed. 2) 1023. 1763 = Voandezia subterranea (L.) Thou.

*G. suffulta* Wall., Cat. n. 5507. 1828 = Shuteria suffulta (Wall.) Benth.

*G. tenerrima* R.Grah. *in* Wall., Cat. n. 5520. 1828 = Teramnus labialis (L.f.) Spreng.

*G. tenuiflora* Klein *in* Willd., Sp. Pl. (ed. 3) 1059. 1802 = Galactia tenuiflora (Klein) W.&A.

*G. tomentosa* L., Sp. Pl. 754. 1753 = Rhynchosia tomentosa (L.) H. & A.

*G. tomentosa* var. *erecta* (Walt.) Michx., Fl. Bor. Amer. 2:63. 1803 = Rhynchosia tomentosa (L.) W. & A.

*G. tomentosa* var. *monophylla* Michx., Fl. Bor. Amer. 2:63. 1803 = Rhynchosia simplicifolia (Walt.) Wood

*G. tomentosa* var. *volubilis* Michx., Fl. Bor. Amer. 2:63. 1803 = Rhynchosia difformis (Ell.) DC.

*G. totta* Thunb., Prodr. Pl. Cap. 131. 1800 = Rhynchosia totta (Thunb.) DC.

*G. triloba* Burm.f., Fl. Ind. 162. 1768 = Phaseolus aconitifolius Jacq., *pro parte maxim.*

*G. tuberosa* Salisb., Prodr. 335. 1796 = Apios americana Medic.

*G. umbellata* Muhl. *ex* Willd., Sp. Pl. (ed. 3) 1058. 1802 = Strophostyles helvola (L.) Ell.

*G. uncinata* (L.) Macbride, Field Mus. Nat. Hist., Bot. Ser. Pub. 13(3):350. 1943 = Teramnus uncinatus (L.) Sw.

*G. uniflora* (Lam.) Dalz., Linn. Soc. London, Jour. 13:146. 1873 = Dolichos biflorus L.

*G. unifoliolata* Bak.f., Jour. Bot. 66, Suppl. 1:144. 1928 = Paraglycine unifoliolata (Bak.f.) F.J.Herm.

*G. upembae* Hauman, Brussels Jard. Bot. de l'État Bul. 25:94. 1955 = Paraglycine upembae (Hauman) F.J.Herm.

*G. vanderystii* De Wild. *in* Fedde, Repert. 12:295. 1913 = Teramnus andongensis (Welw. *ex* Bak.) Bak.f.

*G. velutina* Bert. *ex* DC., Prodv. 2:239. 1825 = Galactia striata (Jacq.) Urb.

*G. vestita* R. Grah. *in* Wall., Cat. n. 5512. 1832 = Shuteria vestita (R. Grah.) W. & A.

*G. villosa* Thunb., Fl. Jap. 283. 1784 = Dunbaria villosa (Thunb.) Mak.

*G. vincentina* Lindl., Bot. Reg. t. 799. 1824 = Chaetocalyx vincentina (Lindl.) DC.

*G. violacea* Schneev., Ic. Pl. Rar. t. 29. 1795 = Hardenbergia monophylla (Vent.) Benth.

*G. virens* Soland. *ex* Steud., Nomencl. (ed. 2) 1:692. 1840 = Hardenbergia monophylla (Vent.) Benth.

*G. virginica* Spreng. *in* Schrad., Jour. 2:198. 1800 = Strophostyles helvola (L.) Ell.

*G. viscida* Willd., Ges. Naturf. Fr. Neue Schr. 4:209. 1803 = Pseudarthria viscida (Willd.) W. & A.

*G. viscosa* Moench, Meth. Suppl. 46. 1802 = Fagelia bituminosa (L.) DC.

*G. viscosa* Roth, Nov. Pl. Sp. 349. 1821 = Rhynchosia viscosa (Roth) DC.

*G. warburgii* Merr., Philippine Jour. Sci. 3:231. 1908 = Pueraria pulcherrima (Koord.) Merr. *ex* Koord.

*G. warrensis* Dalz. *in* Hook., Kew Jour. 3:210. 1851 = Teramnus labialis (L.f.) Spreng.

*G.* (?) *wilmsii* Harms *in* Engl., Jahrb. 26:302. 1896 = Orphrestia oblongifolia (E. Mey.) H. M. Forbes

## Paraglycine F.J.Herm.

**Paraglycine** F.J.Herm., gen. nov.: a genere *Glycine* L. sensu stricto differt foliis 1–7-foliolatis, inflorescentia saepe geminanta, corolla vexillo saltem extus sericeo-strigosa, hilo seminis strophiolo cartilagineo arilloideo praedito.

Herbae volubiles raro ± erectae hirsutae; folia 1- to 7-foliolata; inflorescentiae simplices axillares plus minusve nodosae; flores parvi bibracteolati secus rachin racemorum pedunculatorum (raro sessilium) fasciculati; calyx 5-dentatus; corolla calycem vix usque ad duplum excedens extus vexillo saltem sericea vel strigosa; stamina 10, diadelphia; ovarium 2- to 8-ovulatum stylo haud persistenti; legumen oblongum vel lineari-oblongum compressum aliquantulum marginatum; semina 2–8 oblonga hilo mediano brevi strophiolo cartilagineo arilloideo interdum et caruncula squamiformi praedito.

Species typica: *P. hedysaroides* (Willd.) F.J.Herm.

Differing from *Glycine* in having an incrassate, cartilaginous, arilloid strophiole (similar to that of the Australian genus *Kennedya*); corolla (at least the standard) sericeous-strigose without; inflorescence often geminate; leaflets (always 3 in *Glycine*) from 1 (in *Paraglycine unifoliolata*) to 3 or 4–7 (*in P. digitata*, *P. pentaphylla*, *P. pinnata*, and sometimes in *P. hedysaroides*); vesture often bristly-spreading; pod often only 2-seeded ( in *P. digitata*, *P. unifoliolata* and probably *P. unicostata*) and frequently margined; and standard often panduriform. In most of these characteristics it is closer to *Pseudoeriosema* Hauman (which, like *Paraglycine*, was included by Harms in his Section *Eriosematoideae* of *Glycine*), but few of the species of *Paraglycine* possess more than one or two of the features that differentiate *Pseudoeriosema* from *Glycine*.

*Paraglycine* differs from *Pseudoeriosema* in comprising usually twining vines rather than erect herbs or subshrubs, in its racemose (and usually nodose), rather than capituliform, inflorescence, in its nonaccrescent, more or less deciduous, bract and bractlets, in some of its species (*Paraglycine hedysaroides*, *P. laotica*, *P. madagascarensis*, *P. pentaphylla*, and *P. pinnata*) having only the standard, rather than the whole corolla, pubescent; in most of its species possessing elongate, more than 2-seeded, pods, and half the species in having 5–7 leaflets.

The 10 species of *Paraglycine* known at present may be readily divided into two groups except that *P. radicosa* of the first group is somewhat transitional.

The first group, Section Digitatae (*Glycine*, Section *Tephrosioideae* Harms, *pro parte*)* comprising *Paraglycine digitata*, *P. unicostata*, *P. unifoliolata*, *P. upembae*, and *P. radicosa* shows a close affinity with *Pseudoeriosema* in having all the petals bristly-strigose without,

*Sectio **Digitatae**, F.J.Herm. sect. nov. Corollae petala extus omnia strigosa, *P. radicosa* exclusa inflorescentia setosa ovariumque biovulatum. Typus: *P. digitata* (Harms) F.J.Herm.

in the vesture of the inflorescence as a whole being of erect bristles and in the ovary (except in *P. radicosa*) being 2-ovulate and the pod (unknown in *P. upembae*) short, 2-seeded and bristly (again excepting. *P. radicosa*).

The second group, Section Hedysaroides,** including *Paraglycine hedysaroides*, *P. laotica*, *P. madagascarensis*, *P. pentaphylla*, and *P. pinnata*, is closer to *Glycine* in having glabrous petals, except for the standard, the vesture not bristly, and an elongated, 3- to 8-seeded pod.

## Key to *Paraglycine*

1a. Petals all strigose on the back; inflorescence usually more or less setose; pod often short-oblong and 2-seeded. (Section Digitatae.)
  2a. Leaflet 1 (Belgian Congo; Angola)----------1. *P. unifoliolata*
  2b. Leaflets 3–5.
    3a. Midrib of leaflets stout and conspicuous, secondary veins finely reticulate, inconspicuous.
      4a. Petioles 1–1.7 cm. long; leaf-rachis 0–2 mm. long; leaflets 2–10 cm. long, 2–10 mm. wide, revolute-margined; racemes 2–20 cm. long, usually branched, 4- to 25-flowered; calyx-teeth lanceolate, equaling the tube (Rhodesia). 2. *P. unicostata*
      4b. Petioles 2–3 cm. long; leaf-rachis 5 mm. long; leaflets 3–6 cm. long, 5–7 mm. wide, not revolute; racemes 3–6 cm. long, unbranched, 4- to 6-flowered; calyx-teeth ovate, shorter than the tube (Belgian Congo)----3. *P. upembae*
    3b. Midrib of leaflets not disproportionately stouter than the prominent secondary veins.
      5a. Leaves digitately 5-, infrequently 3- or 4-, foliolate (Tanganyika)----------4. *P. digitata*
      5b. Leaves pinnately 3-foliolate.
        6a. Calyx sparsely strigose with hairs mostly 0.25 mm. long or less; corolla short, generally 4.5–5.5 mm. long; pedicels very slender, mostly 2 mm. long or more; leaflets glabrate to sparsely short-pilose----------5. *P. radicosa*
        6b. Calyx more densely strigose or setose with longer hairs; corolla mostly longer; pedicels relatively stout, usually less than 2 mm. long; leaflets moderately to rather copiously hirsute or strigose, at least beneath.

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**Sectio **Hedysaroides** F.J.Herm., sect. nov. Corollae vexillum solum extus sericeo-strigosa, inflorescentia velutina, hirsuta vel strigosa ovariumque 3–8-ovulatum. Typus: *P. hedysaroides* (Willd.) F.J.Herm.

7a. Corolla mostly 5.5–6.5 mm. long; calyx usually densely ferrugineous-hirsute or strigose with stiff hairs 0.5–1 mm. long; racemes usually compactly flowered; leaflets oblong or narrowly elliptic, about three times as long as wide, usually hirsute beneath; pubescence of stems, petioles and peduncles generally erect-ascending, rather dense and reddish-brown.

5a. *P. radicosa* var. *rufescens*

7b. Corolla mostly 6.5–9 mm. long; calyx moderately strigose with pale-brown to whitish, lax hairs about 0.5 mm. long; racemes loosely flowered; leaflets oval or oboval, scarcely twice as long as wide, usually strigose beneath; pubescence of stems, petioles and peduncles generally appressed, less dense and fulvous-brown ..... 5b. *P. radicosa* var. *enneaneura*

1b. Petals glabrous except the standard which is more or less sericeous on the back; inflorescence strigose; pod elongated, 3- to 8-seeded. (Section Hedysaroides.)

8a. Leaflets 3 (rarely 5 in *P. hedysaroides*).

9a. Racemes sessile or subsessile, about 1 cm. long in anthesis, densely flowered, capituliform or fasciculiform; leaflets elliptic, subcoriaceous, 2–6 cm. long; twining vine (Tropical Africa) ..... 6. *P. hedysaroides*

9b. Racemes long-peduncled, 10 cm. long or more, loosely flowered; leaflets suborbicular or broadly elliptic, membranaceous, 6–12 cm. long; erect shrub or subshrub (Laos).

7. *P. laotica*

8b. Leaflets 5–7.

10a. Legume short-oblong, 3–4 (rarely 5)-seeded; leaflets broadly elliptic-oblong to elliptic-lanceolate (China and India).

11a. Pod densely hirsute or strigose; hairs of leaf-rachis antrorse only above the upper pair of leaflets; racemes 2–9 cm. long in anthesis (China) ..... 8. *P. pinnata*

11b. Pod glabrous; hairs of leaf-rachis antrorse throughout; racemes 4–28 cm. long in anthesis (India).

9. *P. pentaphylla*

10b. Legume linear, 7- to 8-seeded; leaflets narrowly oblong-lanceolate (Madagascar) ..... 10. *P. madagascarensis*


FIGURE 13.—Paraglycine unifoliolata (Bak. f.) F.J.Herm.
(*H. G. Faulkner A–192*; seeds, *D. B. Fanshaw F966*–Kew) Plant × ½. Leaf × 1. Pod (large) × 1.

1. **Paraglycine unifoliolata** (Bak.f.) F.J.Herm. (Fig. 13)

*Paraglycine unifoliolata* (Bak.f.) F.J.Herm., comb. nov.

*Glycine unifoliolata* Bak.f., Jour. Bot. [London] 66, Sup.I, 114. 1928.

Twining or procumbent vine, the *stems* herbaceous, terete, retrorsely hirsute, 60–90 cm. long; *leaves* unifoliolate, their stipules setaceous, rigid, 3.5–5 mm. long, their petioles densely hirsute, 3–3.5 mm. long, the blade elliptic-oblong to narrowly oblong-lanceolate, 3.5–9 cm. long, 4–18 mm. wide, chartaceous, sparsely hirtellous above, moderately so beneath, especially on the veins, the apex obtuse to acute, mucronate, the base rounded or abruptly tapering, with 7–9 pairs of prominent secondary veins beneath; *racemes* axillary, slender, lax, more or less hirtellous, 3–15 cm. long, from equaling to much exceeding the leaves, interruptedly 7- to 16-flowered, the flowers inserted on half to three-quarters of the rachis in fascicles of 2 or 3; *bractlets* and bracteoles minute (0.5–1 mm. long), acicular, hirtellous, caducous; *pedicels* short (1–2 mm. long, becoming 3 mm. in fruit), setose, articulate and somewhat nodose at the base; *calyx* campanulate, 2.5–3 mm. long, ferrugineous-setose, the teeth about 1 mm. long, narrowly lanceolate-setaceous except for the upper pair which are triangular-lanceolate and partly united; *corolla* reddish violet to pink or pale purple, the petals ferrugineous-strigose on the back, the standard panduriform, 4.5–6 mm. long, conspicuously exceeding the wings and keel, the wings narrowly oblong, auriculate, the keel broadly oblong, shorter than the wings; *ovary* hirtellous; *pods* (immature) oblong, 17 mm. long, 5 mm. wide, compressed, sparsely strigose, setose on the thickened margins, 2-seeded, the short style indurated and persistent.

Angola: in gravelly, red, sandy, clay soil, in sunny, hot situation near Ft. Princeza Amelia, Cubango, Ganguellas; fairly common at Membassoco, Cubal. Northern Rhodesia; in plateau-woodland, Ndola.


FIGURE 14.—Paraglycine unicostata F.J.Herm.
(*H. M. Richards 1252* (Type)-Kew) Plant × ½. Leaf detail × ¾. Flower × 3½.

2. **Paraglycine unicostata** F.J.Herm., sp. nov. (Fig. 14)

Herba vel suffrutex ut videtur erecta caulibus teretibus patentim hirsutis foliis 3-foliolatis, foliolis anguste elliptico-oblongis vel oblongo-linearibus subcoriaceis marginibus revolutis valde unicostatis leviter reticulatis obtusis apiculatis supra sparse hirtellis subtus hirsutis; bracteis persistentibus lineari-setaceis; inflorescentiis axillaribus elongatis tenuibus laxissimis ferrugineo-setosis saepe compositis aliquantulum nodosis laxe 4–25-floris; calyce cylindrico-campanulata ferrugineo-setosa dentibus tubo subaequilongis lanceolatis; corolla lilacina extus dense albo-strigosa vexillo panduriformi alis anguste oblongis ad apicem abrupte obovatis valde auriculatis carina breve auriculata; ovario strigoso; legumine immaturo elliptico-oblongo setoso (oligospermo?).

Evidently an erect or semierect herb, 1.5 to 4 dm. or more high, becoming suffruticose and the taller plants probably more or less twining, the *stems* terete, hirsute, the pubescence fulvous to ferrugineous, more dense above; *leaves* digitately trifoliolate (the terminal leaflet rarely raised above the lateral on a rudimentary rachis up to 2 mm. long), their stipules linear-sublate, 4–5 mm. long, 1-nerved, their petioles hirsute, channeled, 1–1.7 cm. long; leaflets narrowly elliptic-oblong to oblong-linear, 2–10 cm. long, 2–10 mm. wide, subcoriaceous, the margins more or less revolute, finely reticulate-veined except for the stout, stramineous midrib which is strongly raised beneath and depressed above, sparsely hirtellous to glabrate above, hirsute below especially along the midrib, tapering at the base, obtuse and apiculate at the apex, on densely hirtellous petiolules 1–2 mm. long; *bracts* linear-setaceous, 2–3 mm. long, persistent: *flowers* in elongated, slender very lax, often compound, loosely 4- to 25-flowered racemes, 2–20 cm. long, arising from the axils sometimes of even the lowermost leaves, the somewhat nodose rachis rather densely ferrugineous-setose on hirsute peduncles 2–6 cm. long; *bractlets* lanceolate, 1–1.5 mm. long, sparsely setose; *pedicels* 1–2 mm. long ferrugineous-setose; *calyx* cylindric-campanulate, 4.5–6 mm. long, ferrugineous-setose, the teeth subequal, lanceolate, equaling the tube or slightly shorter, the upper pair united for about half their length, the setaceous bracteoles 1–2 mm. long, setose, usually appressed; *corolla* lilac to deep mauve, the standard panduriform, 8.5 mm. long, the claw 3 mm., the blade emarginate, densely white-strigose on the back, the wings narrowly oblong, abruptly obovate toward the apex, deeply auriculate, white-strigose on the back, slightly exceeding the keel but shorter than the standard, the keel shallowly auriculate, white-strigose without; style short, stigma capitate, ovary strigose; *pod* (immature) elliptic-oblong, setose-hirsute.

Northern Rhodesia: In sandy soil in open bush, firebreak above Chisungu near Abercorn, alt. 5,000 ft., *Mrs. H. M. Richards 1252*, April 3, 1952 (Type–Kew); among scattered trees in yellow soil in firebreak, top escarpment above D'hulmite; near Abercorn, alt. 5,100 ft., *Mrs. H. M. Richards 4925*, March 14, 1955 (Kew).

Nearest allied to *Paraglycine upembae* of the Belgian Congo which it resembles in its narrow, coriaceous, reticulate, conspicuously costate leaflets with somewhat revolute margins, in its brown-setose calyx-teeth, panduriform standard and petals white-strigose without. It differs, however, in having petioles only 1–1.7 (not 2–3) cm. long, leaf rachis only 0–2 (not 5) mm. long, leaflets up to 10 (not 6) cm. long and 2–10 (not 5–7) mm. wide, much longer (up to 20, instead of 6, cm.) usually branched racemes, often exceeding the leaves and up to 20 (not 6) cm. long, 4–25 (not 4–6)-flowered, on peduncles one-half their length or less (rather than ¾), and lanceolate, rather than short-ovate, calyx-teeth which comprise half, instead of a third, the length of the calyx. The vesture, too, is much more copious and not of retrorse hairs.

*Paraglycine unicostata* is closely allied also to *P. unifoliolata*, in its setose calyx, in its panduriform standard and strigose petals (which, however, are ferrugineous-strigose in *P. unifoliolata* rather than white-strigose), but the single, broader, nonrevolute leaflet of the latter, with its 6–8 pairs of prominent secondary veins, sets it off at once from *P. unicostata.*

3. **Paraglycine upembae** (Hauman) F.J.Herm.

*Paraglycine upembae* (Hauman) F.J.Herm., comb. nov.

*Glycine upembae* Hauman, Fl. Congo Belge, Spermat. 6: 99. 1954; Jard. Bot. de l'État Brux. Bul. 25: 94. 1955.

A climbing herb, the *stems* slender, up to 1 mm. long, 0.5–0.7 mm. in diameter, glabrous; *leaves* pinnately trifoliolate, their petioles 2–3 cm. long, the rachis 5 mm. long; *leaflets* oblong-linear, 3–6 cm. long, 5–7 mm. wide, somewhat coriaceous, the apex acute and mucronate, the base rounded, the margins revolute, glossy and finely reticulate-veined above, sparsely strigose beneath where only the midrib is prominent, on petiolules 1 mm. long; *racemes* axillary, slender, often geminate, one of them 2- to 3-flowered and subsessile, the other 0.75–1.5 cm. long on a slender peduncle 2.25–4.5 cm. long, 4–6-flowered; *bractlets* and bracteoles linear, very short; *pedicels* scarcely 1 mm. long; *calyx* campanulate, 5 mm. long, brown-sericeous, the teeth subequal, oval-acuminate, 1.5 mm. long, the upper pair united only toward the base; *petals* white-strigose on the back, the standard panduriform, 6–7 mm.


FIGURE 15.—Paraglycine digitata (Harms *in* Engl.) F.J.Herm. (*H. E. Emson 378*–Kew) Plant × ½. Leaf detail × 1. Flowers × 3½.

long, the claw very short (1 mm.), wings linear, auriculate, obtuse, nearly equaling the standard and conspicuously exceeding the oblong keel; *ovary* and style villous; *pod* not known.

Belgian Congo: Savannas, Lusinga River, Haut-Katanga, Upemba National Park.

4. **Paraglycine digitata** (Harms *in* Engl.) F.J.Herm. (Fig. 15)

*Paraglycine upembae* (Hauman) F.J.Herm., comb. nov.

*Glycine digitata* Harms *in* Engl., Jahrb. 28: 408. 1900.

Creeping or procumbent vine up to 10 dm. long, the *stems* angled, hirsute; *leaves* digitately 5 (infrequently 3 or 4)-foliolate, their stip-


FIGURE 16.—Paraglycine radicosa (A. Rich.) F.J.Herm.
(*D. B. Fanshaw 2127*–Kew; seeds, *D. F. Froment 275*–Jard. Bot. Brux.) Plant × ½. Pods × ½. Flower and seeds × 4.

ules linear, hirsute, their petioles very short (1.5–2 mm. long), hirsute, channeled; *leaflets* elliptic-lanceolate to oblanceolate, 2.5–5 cm. long, 5–15 mm. wide, firm, rather sparingly hirsute above and beneath (the margins usually strigose-ciliate), the primary and secondary

veins prominent beneath and more densely hirsute, acute at the apex and base, on strigose-hirsute petiolules 0.5–1 mm. long; *bracts* narrowly linear, 4 mm. long, setose; *racemes* short (1.5–2.5 cm. long), densely many-flowered, on long (3–4 cm.), slender, hirsute peduncles about equaling the leaves; *bractlets* setaceous, 2.5 mm. long, very bristly; *pedicels* minute, 0.5 mm. or less long, hirsute; *calyx* campanulate, 3.5–4 mm. long, ferrugineous-setose, the teeth subequal, somewhat exceeding the tube, setaceous except for the upper pair which are lanceolate and united to about the middle, the setaceous bracteoles 2 mm. long, setose; *corolla* purple, the petals ferrugineous-strigose on the back, the standard panduriform, 6–7 mm. long, exceeding the wings and keel, the blade shallowly emarginate, the wings obovate-oblong, long-auriculate, exceeding the oblique-oblong, obtuse keel; *style* short, thick; *ovary* 2-ovulate, strigose; pod not seen.

Tanganyika (Uhehe and Tanga Province), grassy hillsides.

5. **Paraglycine radicosa** (A. Rich.) F.J.Herm. (Fig. 16)

*Paraglycine radicosa* (A. Rich.) F.J.Herm., comb. nov.

*Eriosema radicosum* A. Rich., Tent. Fl. Abyss. 1: 228. 1847.

*Glycine radicosa* (A. Rich.) Bak.f., Legum. Trop. Afr. 358. 1929.

*Glycine schliebenii* Harms, Notizbl. Bot. Gart. Berlin 11: 814. 1933.

Twining or procumbent vine, the *stems* slender, terete, tawny retrorse-hirsute or strigose, up to several meters long; *leaves* pinnately trifoliolate, their petioles retrorsely hirtellous or strigose, 2–5.5 cm. long, channeled above toward the apex, the rachis deeply channeled, 3–12 mm. long; *leaflets* oblong to elliptic, 2–7 cm. long, 1–3 cm. wide, chartaceous, glabrate to very sparsely short-pilose above, more densely so beneath especially on the veins, the hairs more or less appressed, the apex obtuse to abruptly acute, mucronate, the base rounded, with 5–9 pairs of prominent secondary veins beneath, the petiolules stout, 2–2.5 mm. long, setose, the stipels setaceous, nearly 1 mm. long, strigose; *racemes* axillary, slender, loosely 5- to 30-flowered, mostly exceeding the leaves, often long-peduncled, the peduncle and rachis from 3–15 cm. long; *bractlets* very small (1 mm. or less long), acicular, early caducous; *flowers* on very slender pedicels (becoming stout in fruit), 1.5–2.5 mm. long, sparsely strigillose, nodose at the base; *calyx* campanulate, 3–3.5 mm. long, sparsely strigillose with hairs mostly 0.25 mm. long or less, the teeth about half the length of the tube, the upper pair triangular-lanceolate, united toward the base, the lower three more narrowly lanceolate, the bracteoles setaceous, strigil-


FIGURE 17.—Paraglycine hedysaroides (Willd.) F.J.Herm.
(*Warnecke 238*–Mus. Hist. Nat. Paris) Plant × ½. Flower × 3. Pods and leaves × 1. Seed × 2½.

lose, about 1 mm. long; *corolla* blue, lilac or mauve to reddish purple or rose-colored, sericeous on the back, the standard panduriform, 4.5–6 mm. long, exauriculate, somewhat exceeding the wings and keel, the wings narrowly oblong, long-auriculate, the keel oblong, shorter and wider than the wings, auriculate; *pod* oblong, 2–2.5 cm. long, 6–7 mm. wide, sparsely strigose, margined, compressed, the valves little spiraled upon dehiscence; *seeds* 2–4, oblong-oval, 4–4.5×3 mm., compressed cinnamon-brown, smooth, with a cartilaginous, arilloid strophiole surmounted by a short, scalelike caruncle.

Northern Rhodesia, Nyasaland, and Ethiopia. Climbing over low shrubs and grasses in clearings.

5a. **Paraglycine radicosa** var. **rufescens** (Hauman) F.J.Herm.

*Paraglycine radicosa* var. *rufescens* (Hauman) F.J.Herm., comb. nov.

*Glycine schliebenii* var. *rufescens* Hauman, Fl. Congo Belge, Spermat. 6:98. 1954; Jard. Bot. de l'État Brux. Bul. 25:95. 1955.

Stems, petioles and peduncles rather densely reddish brown hirsute; leaflets oblong or narrowly elliptic, about three times as long as wide, usually hirsute beneath, with generally 6–7 pairs of secondary nerves; racemes usually compactly flowered; calyx mostly densely ferrugineous-hirsute or strigose, the hairs 0.5–1 mm. long; corolla generally 5.5–6.5 mm. long.

Northern Rhodesia, Belgian Congo, Ruanda-Urundi, Uganda, and Kenya. In wooded grasslands, or savannas and rocky slopes.

5b. **Paraglycine radicosa** var. **enneaneura** (Hauman) F.J.Herm.

*Paraglycine radicosa* var. *enneaneura* (Hauman) F.J.Herm., comb. nov.

*Glycine schliebenii* var. *enneaneura* Hauman, Fl. Congo Belge, Spermat. 6:99. 1954; Jard. Bot. de l'Etat Brux. Bul. 25:95. 1955.

6. **Paraglycine hedysaroides** (Willd.) F.J.Herm. (Fig. 17)

*Paraglycine hedysaroides* (Willd.) F.J.Herm., comb. nov.

*Glycine hedysaroides* Willd., Sp.Pl., ed 3, 1060. 1802.

*G. pentandra* Spreng., Syst. 3:235. 1826.

*Johnia willdenowii* Hook.f. *in* Hook., Fl. Nigr. 305. 1849.

Climbing herb, often decidedly woody at the base, or a shrub from 0.5–9 m. long; *stems* terete, 2 mm. in diameter, velutinous, up to several meters in length, much branched; *stipules* setaceous, about 2 mm. long; *leaves* pinnately 3- (5)-foliolate, their petioles 1.5–2 cm. long,

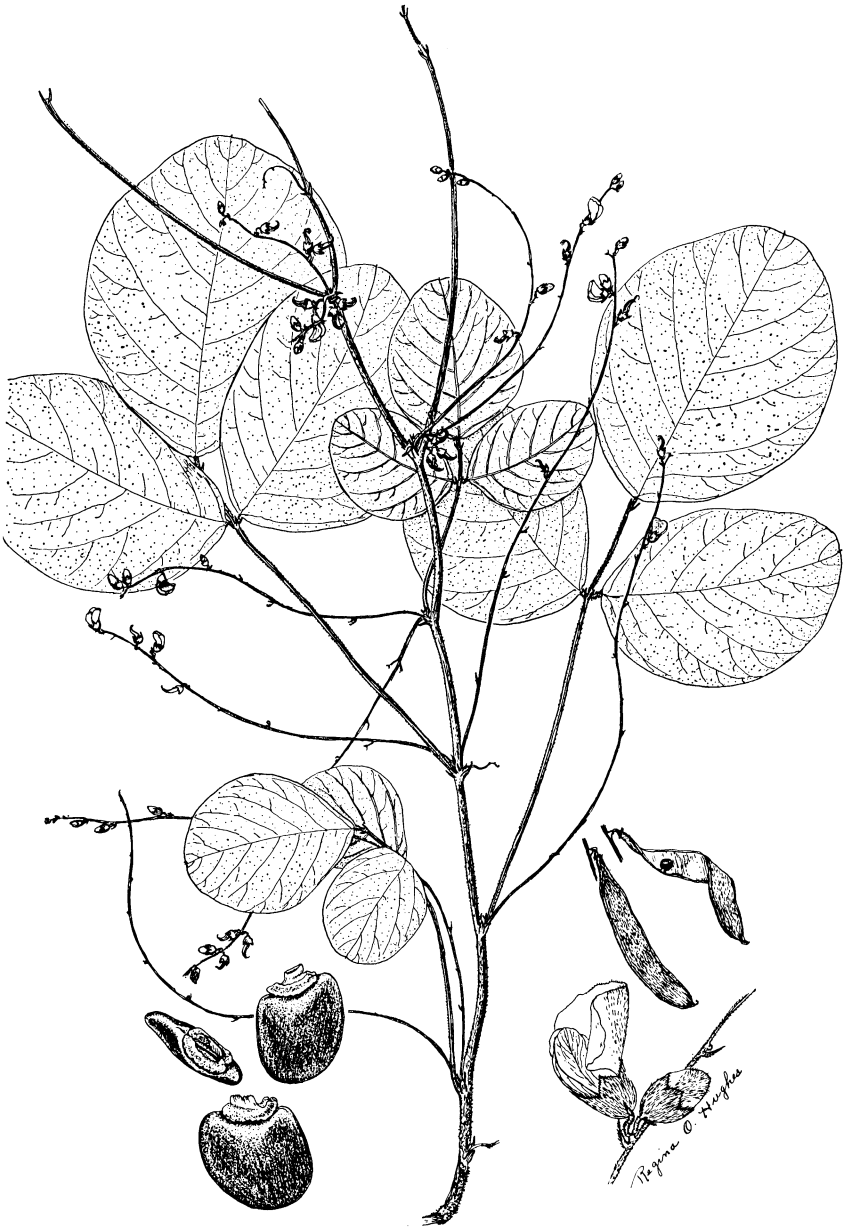


FIGURE 18.—Paraglycine laotica (Gagnep. *in* Lecomte) F.J.Herm. (*Harmond* in 1873–75 (Type); seeds, *Thorel* in 1866–68–Mus. Hist. Nat. Paris) Plant × ½. Flowers × 2½. Pods × ½. Seeds × 4.

velutinous; *leaflets* elliptic, subcoriaceous, 2–6 cm. long, 1–3.5 cm. wide, glabrous above, sericeous-strigose and prominently veined beneath, the apex generally mucronulate, obtuse to retuse, petiolules 1–1.5 mm. long, the rachis 2–9 mm. long; *racemes* axillary, sessile or subsessile, congested but few-flowered, mostly about 1 cm. long (in fruit lengthening to 20 cm. or more); *bractlets* linear to setaceous, strigose to hirsute 1.5–2 mm. long; *flowers* on densely pubescent pedicels about 1.5 mm. long; *calyx* 5–9 mm. long, white-hirsute, conspicuously nerved, the lanceolate-attenuate teeth 3–4 mm. long, exceeding the tube, usually more or less pubescent within; *corolla* white to pale yellow or pinkish, the standard suborbicular, 7 mm. long (the claw one-third the length of the blade), silky-strigose on the back, the wings and keel 6–7 mm. long, sometimes sparsely hairy toward the tip; *pod* linear, 30–60 mm. long, 6–8 mm. wide, non-septate, strongly compressed, strigose, becoming glabrate; *seeds* 4–6, oval or oblong-oval to suborbicular, 5–6×3.5–4 mm., reddish brown to purplish black, the strophiole incrassate, straw-colored, translucent, arilloid, the ridge comparatively narrow, forming a low collar around the hilum.

Guinea to Tanganyika and Angola. More or less twining on low vegetation in grasslands and abandoned fields, usually in sandy but sometimes clay soil.

7. **Paraglycine laotica** (Gagnep. *in* Lecomte) F.J.Herm. (Fig. 18)
*Paraglycine laotica* (Gagnep. *in* Lecomte) F.J.Herm., comb. nov.
*Glycine laotica* Gagnep. *in* Lecomte, Not. Syst. 3: 196. 1916.

Erect shrub or shrubby perennial herb from a woody root; *stems* terete, grayish hirtellous, about 40 cm. high, floriferous from the base or a little above; *leaves* pinnately trifoliolate, their petioles antrorse-hirtellous, channeled, 5–16 cm. long, the rachis about 3 cm. long; *leaflets* broadly elliptic to suborbicular, 5–12 cm. long, 4–11 cm. wide, rounded at both ends or the apex emarginate and mucronate, thin, pale green (almost glaucous beneath), minutely and sparsely appressed-pilose, the hairs more abundant on the nerves beneath, with 7–8 pairs of conspicuous veins, the petiolules 3–4 mm. long, hirsute, the conspicuous stipels setaceous, 4–5 mm. long, strigose; *racemes* axillary, slender, 4–18 cm. long, strigose, loosely flowered from about the middle, often paired (sometimes one of the pair greatly reduced) in the axils, the bracts firm, persistent, from broadly lanceolate in the lower axils to linear-attenuate in the upper, 4–7 mm. long; *bractlets* small, 1–2 mm. long, setaceous, hirtellous, more or less caducous; *flowers* on slender, hirtellous pedicels about 2 mm. long, articulate at the base and geminate; *calyx* broadly campanulate, 3.5–4 mm. long, densely appressed-pilose, the lobes 4 (the two uppermost fused into

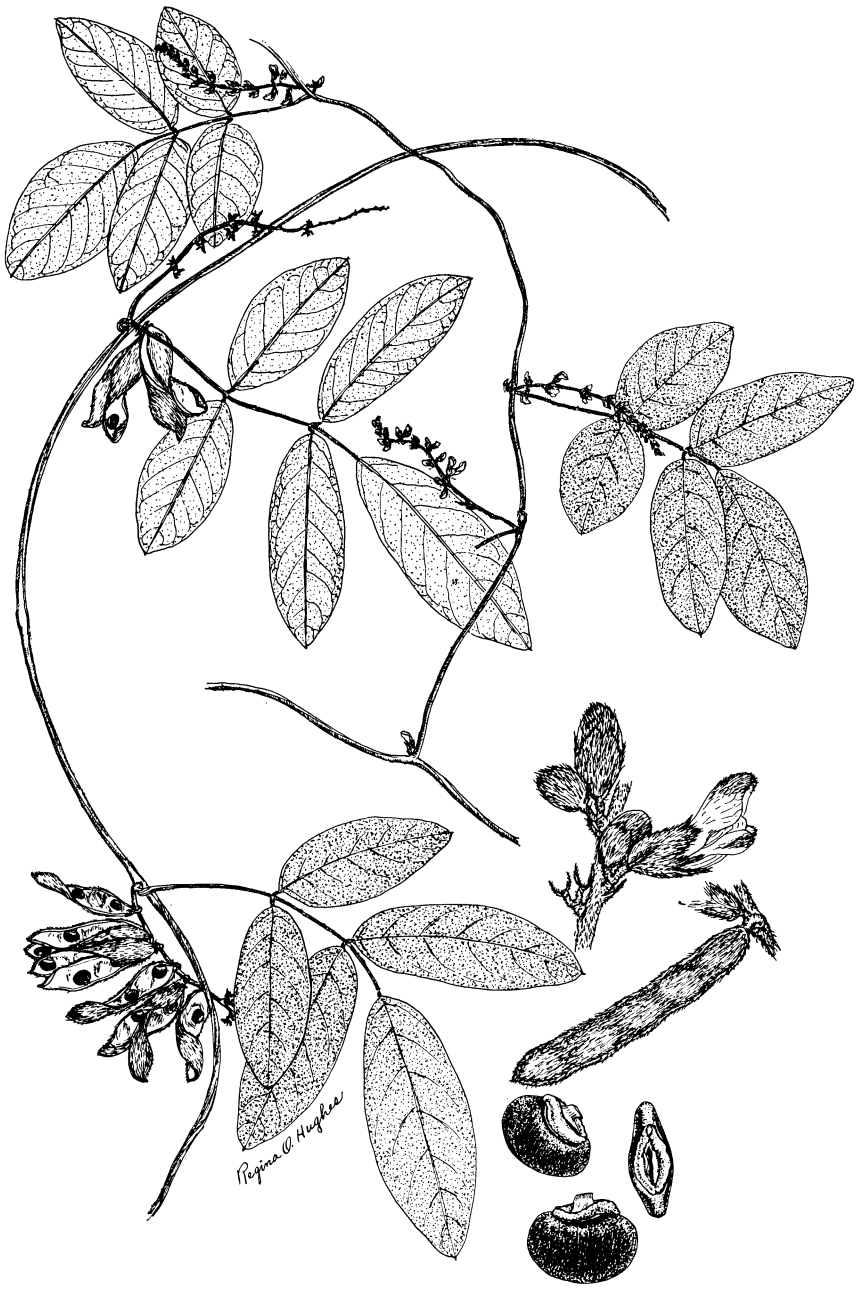


FIGURE 19.—Paraglycine pinnata (Merr.) F.J.Herm.

(*S. K. Lau 2839;* inflorescence, *C. I. Lei 1008*–Arn. Arb. Herb.; seeds, *H. Y. Liang 66036*–Kew) Plant × ½. Inflorescence × 3½. Pod × 1. Seeds × 4.

a single lobe) short (mostly 1 mm. long), deltoid, obtuse but the lowermost acute to acuminate and sometimes nearly as long as the tube, the bracteoles minute (1 mm. long or less), acicular, strigose, appressed, caducous; *corolla* pale, the standard reniform, 6.5–8 mm. long, sericeous on the back, exauriculate, erect, exceeding the wings and keel, the wings obovate, somewhat falcate, auriculate, obtuse, the keel obovate, auriculate, broadly obtuse; *pod* linear, 4–6 cm. long, 7–9 mm. wide, compressed, margined, finely appressed-pilose, attenuate at the base, scarcely depressed between the seeds; *seeds* 5–6, obliquely suborbicular, compressed, 4×5 mm., chocolate brown, smooth, with an indurated, cartilaginous, cushionlike strophiole surmounted by a scarious, squamiform caruncle.

Laos (Bassac, and between Mékong and Heré).

8. **Paraglycine pinnata** (Merr.) F.J.Herm. (Fig. 19)

*Paraglycine pinnata* (Merr.) F.J.Herm., comb. nov.
*Glycine pinnata* Merr., Lingnan Sci. Jour. 14: 15. 1935.

A climbing vine, the *stems* herbaceous to woody, rather coarse, up to 2.5 mm. in diameter, terete, shallowly striate above, retrorsely hirsute; *leaves* pinnately 5 (infrequently 7)-foliolate, their petioles densely retrorse-hirsute, 3–5 cm. long, the rachis channeled, retrorsely hirsute below the upper pair of leaflets, antrorsely so above the upper pair; *leaflets* oblong-elliptic to elliptic, 3–8.5 cm. long, 14–38 mm. wide, olive-green above, paler beneath, the apex obtuse to acuminate, mucronate, the base rounded to abruptly tapering, glabrate to minutely and very sparingly strigose above more densely so beneath, especially on the nerves, with 7–9 pairs of lateral veins, the petiolules 1.5 mm. long, densely hirsute, the stipels acicular, minute (0.5–1 mm. long) or obsolete; *racemes* axillary, rather slender, shorter than the leaves, 4–9 cm. long, retrorse-hirsute, usually flowered nearly to the base, the bracts small, setaceous; *bractlets* acicular, very small (1 mm. long), hirsute, early-caducous; *flowers* on short (1 mm. long), hirsute, mostly geminate pedicels which are nodose and articulate at the base but with the calyx often persistent on the rachis after the fall of the pods; *calyx* campanulate, 2.5–3 mm. long, densely hirsute, the upper pair of teeth united into a triangular-ovate lobe, the lower three lanceolate, all about 1 mm. long, shorter than the tube, the bracteoles acicular, 1 mm. long strigose; *corolla* reddish purple to pink, the standard panduriform, 5.5–6 mm. long, sericeous on the back at least toward the apex, the wings and keel subequal, shorter than the standard; *pod* oblong, 3–3.5 cm. long, 7 mm. wide, densely brown-hirsute-tomentose to hirsute-strigose, margined (but the thickened margin hidden by the dense pubescence), somewhat depressed between the seeds, the valves strongly spiraled upon dehi-


FIGURE 20.—Paraglycine pentaphylla (Dalz. *in* Hook.) F.J.Herm. (*W. A. Talbot*, Sept. 1881; mature pods, *Stocks*, s.n.–Kew) Plant × ½. Pods × ½. Flower × 4. Immature seed × 2½.

scence; *seeds* 4–5, oblong-oval, 4–5×3.5–4 mm., compressed, reddish brown to chocolate brown, smooth, with an indurated strophiole in the form of a cartilaginous hilum-collar, surmounted by a scarious scalelike caruncle.

China (Fung Leng, Ngai District, Ka Chik Shan, Ch'ang-kiang District and Pak Shik Ling, Ching Mai District, Hainan, in thickets on slopes).

9. **Paraglycine pentaphylla** (Dalz. *in* Hook.) F.J.Herm. (Fig. 20)

*Paraglycine pentaphylla* (Dalz. *in* Hook.) F.J.Herm., comb. nov.
*Glycine pentaphylla* Dalz. *in* Hook., Jour. Bot. 4: 344. 1852.

Twining or creeping vine, the *stems* terete, strigose; *leaves* pinnately 5- to 7-foliolate, their petioles very sparsely retrorse-strigose, 3–6 cm. long, the rachis more or less antrorsely strigose, channeled, 3–6 cm. long; *leaflets* elliptic-lanceolate, 3–11 cm. long, 12–34 mm. wide, the apex from obtuse to acuminate, mucronate, the base rounded to abruptly tapering, minutely and sparsely white-strigose above, more densely so beneath, with 5–8 pairs of lateral veins, the petiolules hirsute, 1.5–2 mm. long, the stipels greatly reduced (about 0.5 mm. long), inconspicuous, fugacious, or sometimes obsolete; *racemes* axillary, slender (becoming stout in fruit), 4–28 cm. long, sometimes geminate, finely strigose, loosely to interruptedly flowered nearly from the base, the bracts firm, setaceous, 3.5–4 mm. long; *bractlets* acicular, strigose, 1–1.5 mm. long, caducous; *flowers* on slender, strigose, geminate pedicles, 1–2 mm. long which are nodose and articulate at the base; *calyx* campanulate, 2.5–3 mm. long, rather densely appressed-pilose, 5-toothed, the upper pair of teeth fused nearly or quite to the tip, the teeth deltoid, acute, much shorter (0.5–1 mm. long) than the tube, the bracteoles minute, inconspicuous, acicular, strigose, caducous; *corolla* apparently reddish, the standard panduriform, 6–7 mm. long, sericeous on the back, ascending or erect, conspicuously exceeding the subequal wings and keel, the wings narrowly oblong, the keel narrowly obovate, obtuse; *pod* oblong-linear, 3–4 cm. long, 7–8 mm. wide, compressed, margined, apiculate, finely and sparsely strigose at maturity to glabrate, little depressed between the seeds; *seeds* (very immature) 3, strophiolate.

India (Khasia and Konkan, alt. 3,000 to 5,000 ft.)

FIGURE 21.—Paraglycine madagascarensis F.J.Herm.

(*P. de la Bâthie 184* (Type)–Mus. Hist. Nat. Paris) Plant and pods × ½. Flowers × 4. Seed (immature) × 2½.

10. **Paraglycine madagascarensis** F.J.Herm., sp. nov. (Fig. 21)

Herba volubilis caulibus patentim vel retrorsum hirsutis, foliis 7-foliolatis, foliolis anguste oblongo-lanceolatis hirtellis apice breve acuminatis vel abrupte acutis apiculatis; bracteis subulatis caducis; inflorescentiis axillaribus nodosis foliis brevioribus; floribus brevipedicellatis, calyce campanulata ferrugineo-strigosa dentibus tubo subaequilongis deltoidiis (infima lanceolato-acuminata) marginibus saepe plus minusve glabratis; vexillo corollae ovato-oblongo auriculato-hastato extus sericeo, carino quam alis oblongis longiore plus minusve falcata; ovario glabro; leguminibus lineari-oblongis valde compressis; seminibus 7–8, elliptico-oblongis, compressis glabro strophiolo indurato arilloideo praeditis.

A twining vine, the *stems* terete, more or less hirsute to tomentose; *leaves* pinnately 7 (rarely 5)-foliolate, their petioles 1.5–4 cm. long, hirtellous; *leaflets* narrowly elliptic- to oblong-lanceolate 2–7 cm. long, 6–18 mm. wide, hirtellous on both surfaces, sometimes rather sparsely so above and copiously so beneath, short-acuminate to abruptly acute and apiculate, rounded at the base, the midrib and 5–7 secondary veins prominent beneath, on densely hirtellous petiolules 1–2 mm. long; *bracts* subulate, 2–3 mm. long, more or less strigose, often caducous; *flowers* in axillary racemes, 1–6 cm. long, shorter than the leaves, on peduncles 3–10 mm. long; *bractlets* subulate, 1 mm. long, strigose, fugacious; *pedicels* 0.25–1.5 mm. long, sparsely strigose, strongly nodose at their junction with the rachis; *calyx* campanulate, 3–5 mm. long, densely ferrugineous-strigose, the teeth, except the lowermost, broadly deltoid, abruptly attenuate-acuminate, equaling or slightly shorter than the tube, often glabrate toward the margins and the edges, white-sericeous-ciliate, the upper pair united for about half their length, the lowermost tooth lanceolate-acuminate, the setaceous bracteoles about 1 mm. long, sparsely strigose; *corolla* evidently whitish, the standard ovate-oblong, 5–6 mm. long, the blade auriculate-hastate, 3.25–3.5 mm. long, sericeous on the back at least toward the apex, the wings oblong, auriculate and, like the conspicuously longer keel, somewhat falcate; *ovary* glabrous; *pod* linear-oblong, 4.75–5.5 cm. long, 6.5–7 mm. wide, glabrous, strongly compressed, slightly curved toward the apex, not septate nor impressed between the seeds; *seeds* (not fully mature) 7–8, elliptic-oblong, 3.5×2.25 mm., compressed, smooth, reddish brown, with an indurated, cartilaginous, arilloid strophiole.

Alixeville, Madagascar, *H. Perrier de la Bâthie 184*, March 1897 (Type–Herb. Mus. Paris). Distributed as *Glycine lyallii* Benth.

A species strikingly resembling *Pseudoglycine lyallii* (which is apparently likewise restricted to Madagascar but much more plentiful) in many characteristics, including the general aspect (except

for the consistently narrow, oblong-lanceolate leaflets, the conspicuously nodose rachis of the raceme and the lack of evident gradual anthesis of the racemes), and in the tendency toward glabrate margins in the calyx-teeth, but it is completely different in its pods, seeds, hastate-auriculate standard and short wing petals. The collection by Perrier de la Bâthie in 1897 (two sheets in the Paris Museum) is the only material that has been seen.

## Pseudoglycine F.J.Herm.

**Pseudoglycine** F.J.Herm., gen.nov: a genere *Glycine* L. sensu stricto differt foliis 5- to 7-foliolatis, calycis lobis obtusis petaloidiis late marginatis, vexillo corollae extus ad apicem sericeo, stylo persistenti fructu indurato, hilo seminis caruncula membranacea circumdato.

Genus ut videtur monotypicus: herba volubilis vel scandens fulvo-rufo-hirtella; caules tenues; folia 5–7 (raro 3)-foliolata foliolis dimorphis, nunc oblongis vel ellipticis, nunc elliptico- vel lanceolato-ovatis; flores parvi bibracteolati in racemis axillaribus secus rachin fasciculati; calyx 5-dentatus tubo basi plus minusve asymmetrico lobis infimo excepto petaloidiis obtusis late marginatis; corolla albolutescens calyce fere duplo longior vexillo extus ad apicem sericeo; alae carinaque oblongae subaequilongae vexillo non breviores; stamina 10, diadelphia; ovarium 6- to 8-ovulatum strigillosum, stylo persistenti fructu accrescenti indurato; legumen lineari-oblongum rectiusculum longo-cuspidatum; semina 4–6 transverse oblonga caruncula membranacea squamiformi et annuliformi praedita.

Species typica: *P. lyallii* (Benth.) F.J.Herm.

In common with *Paraglycine* this genus has up to seven leaflets and fascicles of pedicels at least obscurely nodose. It differs from both *Paraglycine* and *Glycine* in its widely margined, petaloid, obtuse calyx-lobes, in its persistent style indurated in fruit, and in its glabrate standard, usually only sparsely sericeous toward the apex. Its seed lacks the cartilaginous, arilloid strophiole of *Paraglycine*, possessing instead the squamiform caruncle of *Glycine*, but in addition the hilum is encircled by a short membranaceous collar. The genus appears to be monotypic and restricted to Madagascar.

**Pseudoglycine lyallii** (Benth.) F.J.Herm. (Fig. 22)

*Pseudoglycine lyallii* (Benth.) F.J.Herm., comb. nov.

*Glycine lyallii* Benth., Linn. Soc. London, Jour., Bot. 8:266. 1865.

*G. lantzii* (sphalm: "lanztii") Baill., Bul. Mens. Soc. Linn. Paris 1:382. 1883.

FIGURE 22.—Pseudoglycine lyallii (Benth.) F.J.Herm.

(*Bréon 24*, habit and pods; *Humbert 11215*, oblong leaflets; *P. de la Bâthie 4139*, elliptic-lanceolate leaflets; *P. Genaud 18*, flower detail–Mus. Nat. Hist. Paris; seeds, *Lyall 222*–Kew) Habit and pods, × ½. Flower detail × 4. Seeds × 1½.

A twining or climbing vine, the *stems* subterete, slender, rather densely hirtellous with usually retrorse reddish or yellowish hairs; *leaves* pinnately (3) 5- to 7-foliolate, their petioles 0.5–3 cm. long; *leaflets* dimorphic, sometimes oblong to elliptic (infrequently elliptic-lanceolate) 1.5–2.5 (7) cm. long, 5–8 (18) mm. wide, coriaceous, densely hirtellous on both surfaces, obtuse or abruptly acute and apiculate, the veins stout and raised beneath, sometimes ovate-lanceolate, 3.5–8 cm. long, 20–40 mm. wide, thin-membranaceous, sparsely strigose above, moderately so beneath, acuminate, the veins, except the midrib, not conspicuous, the base rounded or abruptly tapering, on hirtellous petiolules 0.25–2 mm. long; *bracts* subulate, 2–3 mm. long, strigose; *flowers* in axillary, rather dense, racemes 2–8 cm. long which equal or exceed the leaves, on peduncles 10–40 mm. long, the anthesis gradual (upper buds opening much later than the lower); *bractlets* setaceous, 1.25–2 mm. long, densely strigose, fugacious before anthesis; *pedicels* 1–2 mm. long, strigose-hirtellous, usually erect along the rachis and bent at a right angle below the calyx, somewhat nodose at their junction with the rachis; *calyx* campanulate, 3.25–3.5 mm. long, the tube densely ferrugineous-setose-strigose, the lobes except the lowermost, ovate, obtuse, averaging 1.5 mm. long, but the upper pair united for about half their length, sparsely setose-strigose, the hairs usually confined to a median line, giving the lobes a broadly margined, petaloid appearance, the margins usually minutely white-sericeous, the lowermost lobe somewhat exceeding the rest (averaging 2 mm. in length), lanceolate-acuminate, not margined, the setaceous bracteoles 1 mm. long, densely strigose, often appressed and inconspicuous; *corolla* yellowish-white, the standard obovate, 6 mm. long, the blade auriculate, 3.5 mm. long, more or less sericeous on the back especially toward the apex, porrect or erect-ascending, the claw 2.5 mm. long, the wings narrowly oblong, auriculate, slightly shorter than the narrowly obovate keel which equals the standard in length; *ovary* strigose; *pod* linear-oblong, 7–9 cm. long, 9–10 mm. wide, glabrous, compressed, slightly curved toward the apex, not septate between the seeds, the indurated style forming a beak 8–10 mm. long; *seeds* 6–8, transversely oblong, 8–9 × 4–5 mm., irregularly compressed, usually truncate at least at one end, rugulose, black, more or less glossy, with a castaneous, chartaceous, scalelike caruncle extending the full length of the hilum on one side, the opposite side and ends surrounded by a short collar of similar texture.

Madagascar; evidently common. In sandy thickets, along hedgerows, and on siliceous gravel and rocky plateaus.

## **Teyleria** Backer

*Teyleria* Backer, Jard. Bot. Buitenzorg Bul. (ser. 3) 16:107. 1939.

Twining herbaceous perennial. Stems angular, sulcate above. Leaves pinnately trifoliolate. Flowers small, in axillary, often irregularly branched racemes, the peduncle and rachis angular, the bractlet at the base of the pedicel, and pair of bracteoles at the base of the calyx, persistent. Pedicels conspicuously nodose (the node persistent on the rachis as an irregular swelling) and articulate at the base. Calyx 5-toothed, the tube abruptly truncate to inflexed at the base, the teeth sericeous within, the margins setose-strigose without, the upper pair united toward the base. Corolla papilionaceous, glabrous, little exceeding the calyx. Standard obovate, not auriculate. Wings narrowly oblong, auriculate, adherent to the keel. Keel obtuse, long-clawed, about equaling the wings. Stamens monadelphous, the vexillar stamen only slightly coherent with the tube. Ovary sessile, 6- to 8-ovulate. Style short, curved. Stigma terminal, capitate. Pod linear, somewhat curved, bivalved, septate between the seeds, compressed, apiculate; seeds almost quadrate, compressed, estrophiolate, carunculate.

Evidently monotypic.

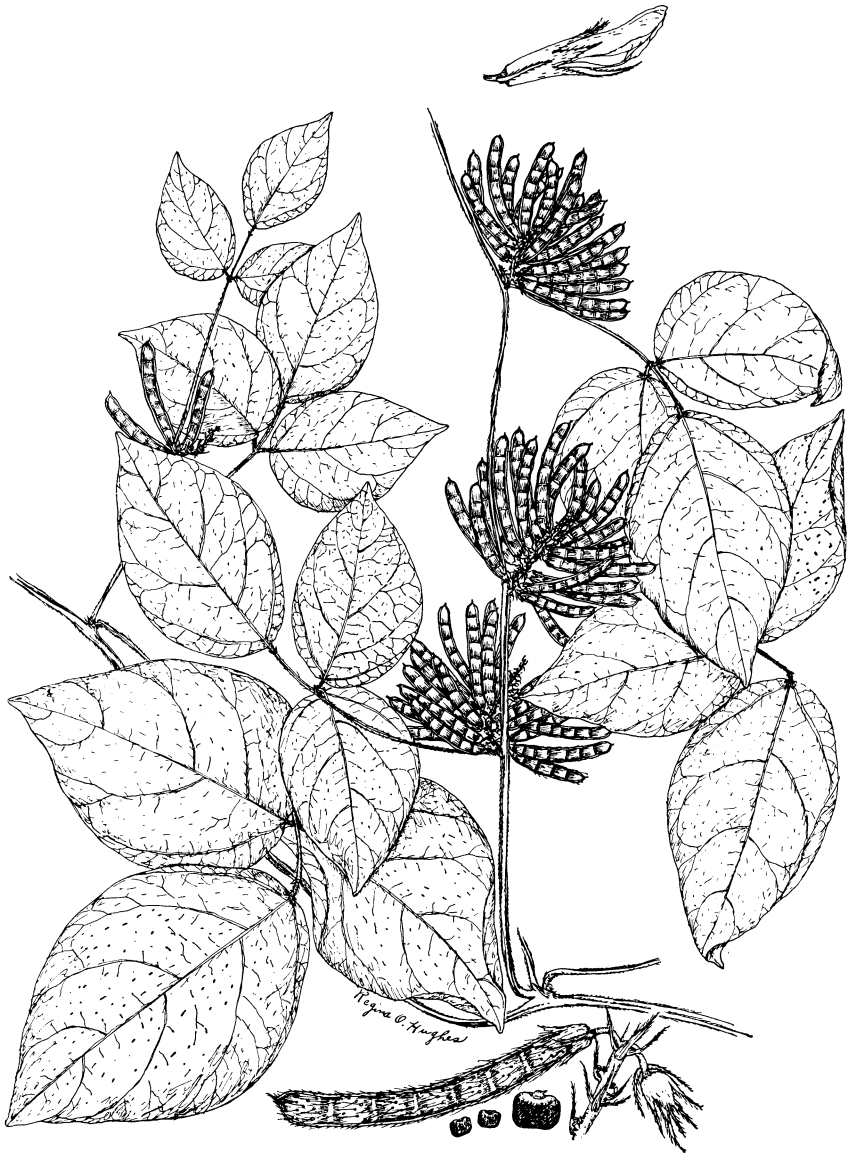

FIGURE 23.—Teyleria koordersii (Backer) Backer.

(*S. K. Lau 3035*–Arn. Arb.) Plant × ½. Flower × 5. Pod × 1½. Seeds (small) × 1.

**Teyleria koordersii** (Backer) Backer (Fig. 23)

*Teyleria koordersii* (Backer) Backer, Jard. Bot. Buitenzorg Bul. (ser. 3) 16:108. 1939.

*Glycine koordersii* Backer, Schoolflora voor Java 358. 1911.

*G. hainanensis* Merrill & Metcalf, Lingnan Sci. Jour. 16:194. 1937.

A climbing vine; *stems* rather stout, about 2 mm. in diameter, more or less angular, densely hirsute on the angles with appressed, retrorse hairs, the upper part often sulcate; *leaves* pinnately trifoliolate, their petioles 4–6 cm. long, sparingly retrorse-strigose and more or less sulcate, the rachis 1.2–2 cm. long; *leaflets* chartaceous, glabrous or very sparingly reflexed-hirsute, the veins prominent, raised beneath, ovate-acuminate or abruptly acute, rounded at the base, on petiolules 3–4 mm. long, the two lateral leaflets inequilateral and somewhat smaller than the terminal, the terminal leaflet equilateral, 6–14 cm. long, 2.5–7 cm. wide, with 3 or 4 pairs of lateral veins; *bracts* persistent, coriaceous, lanceolate, 3–4 mm. long, strongly ribbed, more or less hirsute; *racemes* axillary, often irregularly branched, the rachis sharply angular, from loosely to densely flowered, 2.5–4 (in fruit–8) cm. long, on quadrangular peduncles 0.5–18 mm. long, retrorsely scabrous on the angles; *bractlets* persistent, curved, setaceous, 2.5–3.5 mm. long, sparsely strigose or hispid; *pedicels* 1–2 (in fruit–3) mm. long, glabrate, sometimes swollen below the calyx; *calyx* 5–5.5 mm. long, the tube cylindric-campanulate, abruptly truncate or even inflexed at the base, glabrate to sparsely appressed-hirsute, the teeth narrowly lanceolate-acuminate, equaling or somewhat exceeding the tube, sericeous within, usually sparsely strigose without except for the heavily setose-strigose margins, the lower tooth somewhat exceeding the rest, the upper pair united towards the base, the setaceous bracteoles 2 mm. long, sparingly strigose; *corolla* white, 6–7 mm. long, equaling or slightly exceeding the calyx, the narrowly oblong wings and keel violet-tipped, subequal, slightly shorter than the porrect to ascending, obovate, exauriculate standard; *pods* usually crowded, spreading-ascending, linear, slightly curved, compressed, usually 6- to 8-seeded, transversely septate between the seeds, bristly hirsute with sordid hairs 1–1.5 mm. long; *seeds* almost quadrate with rounded corners, 2.5–2.75 × 3–3.25 mm., compressed, reddish brown, smooth or irregularly minutely pitted, estrophiolate, the caruncle short, liguliform, scarious.

Java; Hainan, China (Ka Chik Shan and Tok Mooi Shan, Ch'andkiang District) where said to be climbing on shrubs in thickets and open places on dry, sandy slopes.

# INDEX

(For names not included here see *Excluded Species*, p.41. New taxa, new combinations, and new names appear in bold-face type, other accepted names in roman, synonyms in italics.)

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